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Original Articles.

PARATYPHOID FEVER IN CHILDREN.*

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PARATYPHOID fever in children is not so rare as the current literature and text-books would suggest. Thus, Rimpau, on bacteriological examination of 122 infants up to 1 year old with clinical symptoms of dyspepsia, acute and chronic gastro-intestinal catarrh and dysentery, found *Bacillus paratyphosus* or Gaertner's bacillus in 9 cases. Gildemeister and Baertlein, on bacteriological examination of 70 babies with intestinal catarrh, found *B. paratyphosus* in 4 cases.

HISTORICAL NOTE.

In 1896 the French physicians, Achard and Bensaude, reported two cases under the name "infection paratyphoidique," caused by "*Bacilles paratyphiques.*" Subsequently analogous cases were described in America by Gwyn, Cushing, etc., in Germany by Schottmüller (1900), Kurt, etc., in England by Graig and White, Savage, Cautley, etc., and in Russia by Beliaev, Poggenpol, Stolkind, etc.

Schottmüller recognised two kinds of *Bacilli paratyphosi.*

The following clinical classification of paratyphoid fever was proposed by one of us (Stolkind) many years ago: (1) Typhoid

* This article is written by E. Stolkind; the cases cited were observed by E. Stolkind and A. Lorey.

form, (2) gastro-intestinal form, (3) choleraic form, and (4) respiratory or influenzal form. There may be also atypical cases. Clinically and pathologically there is no difference between paratyphoid A and B, which vary only bacteriologically. Paratyphoid C and D have been observed in a few cases, and have only a bacteriological interest.

Morbid Anatomy.

Reports of cases of paratyphoid fever in children, with autopsies, are very few in number. Such cases, therefore, have a certain interest, and we will first record our own cases with the post-mortem examination made by Dr. Fraenkel.

The bacteriological examination of the blood, stools, urine, etc., in our cases was made according to the usual methods. The blood was taken from a vein (or post mortem from the right heart), mixed with bile-agar, etc., and the *B. paratyphosus* was then isolated and differentiated in the usual manner by making plates of Drigalski-Conradi and other media of the coli-typhoid group.

Case 1.—A very weak male infant, aged 9 months, with severe rickets. The illness began with diarrhœa, cough, and bronchitis; later broncho-pneumonia developed. The last six days numerous liquid, green stools occurred; temperature 101·3°–103·8° F. *Autopsy:* Follicular enteritis, broncho-pneumonia in both lungs. Blood-culture and agglutination showed *B. paratyphosus* B.

Case 2.—A female infant, aged 5 months, with atrophy and severe rickets. The baby was recovering from chickenpox, had had normal stools and temperature for three weeks, and gained over 1 lb. in weight. In the last seven days she had had fever (102°–104·5° F.), diarrhœa (between eight to ten liquid and fœtid stools), and a pulse of 100–120. Weakness increased and death took place. *Autopsy:* Mild form of follicular enteritis with swollen mesenteric glands. *B. paratyphosus* B was cultivated from the blood; positive agglutination (1 : 16,000).

Case 3.—A miserable-looking girl, aged 9 months, suffering from rickets and atrophy. On the third week of whooping-cough bronchitis and fever appeared, and lasted ten days; later, after nearly five weeks of normal temperature (*i. e.* on the eighth week of whooping-cough) the temperature rose again (100·4°–101·8° F.), pulse 120–132, there were liquid green stools for a week, and then death took place. *Autopsy:* Follicular enteritis. Blood-culture and positive agglutination (1 : 16,000) showed *B. paratyphosus* B.

Case 4.—A badly-nourished and very rickety girl, aged 10 months, suffering from whooping-cough and later from bronchitis. After eleven days of normal stools and temperature numerous liquid green stools, fever (100·8°–105·1° F.), and broncho-pneumonia occurred during the last twelve days of life. *Autopsy:* Severe follicular enteritis; broncho-pneumonia in both lungs; severe rickets. *B. paratyphosus* B and pneumococci were isolated from the blood; positive agglutination (1 : 16,000).

This child was probably infected with paratyphoid by Case 3, who was in the ward at the same time.

Case 5.—A rickety girl, aged 1 year and 3 months, suffering from whooping-cough, bronchitis, and fever. In the last thirteen days numerous liquid, green stools; in the last five days broncho-pneumonia. The temperature gradually rose from 99·7° to 104·4° F.; pulse 120–140. *Autopsy:* Follicular enteritis; laryngitis; tracheitis; multiple areas of broncho-pneumonia in both lungs; severe rickets. Blood-culture and positive agglutination (1 : 2000) showed *B. paratyphosus* B.

This case was probably infected by Case 4.

Case 6.—A badly-nourished girl, aged 5 months, suffered with diarrhœa and cough about four days. On admission to hospital she presented much meteorism, diarrhœa, broncho-pneumonia, and a palpable spleen. Temperature 102·2°–107·2° F. Death took place after three days. *Autopsy:* Follicular enteritis; multiple areas of broncho-pneumonia in both lungs; enlargement of the spleen. Blood-culture and positive agglutination (1 : 10,000) with patient's own bacilli showed paratyphoid B.

Case 7.—A well-developed boy, aged 8 years. The illness began with lassitude, coryza, and cough; on the third day measles eruption, and fever; on the fourth day diarrhœa. His sister was suffering from measles at the same time. On admission to hospital on the sixth day the boy looked very ill and pale; complete stupor, restlessness, delirium, meningeal symptoms (slight Kernig, nuchal rigidity), swollen and inflamed tonsils, severe bronchitis, meteorism, albumin in urine; liquid yellow stools, fever (104° F.). A nearly pure culture of *B. paratyphosus* B was obtained from the stools and from the blood. Leucocytes 7800. On the eighth day great cyanosis and more pronounced meningeal symptoms. On lumbar puncture the cerebro-spinal fluid showed only slight hypertension and no abnormal elements. In the last two days broncho-pneumonia of both lungs, subsultus tendinum, and restlessness. Death took place on the ninth day. *Autopsy:* Confluent broncho-pneumonia in

both lungs; exudative bronchitis; purulent otitis media; external hydrocephalus. In the ileum the mucous membrane appeared slightly thickened; Peyer's patches slightly swollen; raised solitary follicles, and of the same colour as the surrounding tissue. In the cæcum the mucosa was pale, grey, and shiny. There was a slight injection of the ascending and descending colon. The heart blood, bone marrow, meninges, and spleen showed a pure culture of *B. paratyphosus* B. The pus of the ear showed paratyphoid B bacilli, and pneumococci. Agglutination positive (1 : 5000).

This case has a special interest: (1) It was an instance of mixed infection of measles, paratyphoid B, and otitis media, with *B. paratyphosus* B and pneumococci in the pus. The *B. paratyphosus* B in stools (in almost pure culture), in blood, bone marrow, spleen, and pus, the positive agglutination, diarrhœa during the illness, and the pathological changes in the intestine, etc., prove that it was a case of measles, in the course of which the paratyphoid infection occurred. The pathological lesions found at the autopsy resembled those which are often observed in the first week of typhoid fever, and belong to the so-called transitional form.

Case 8.—A very rickety girl, aged 1 year. The illness began suddenly, and on the fourth day sore throat, broncho-pneumonia, and meteorism were observed. On the eighth day red spots appeared on the face, and on the ninth day an eruption like measles was noticed on the whole body, and disappeared on the same day. There were typhoid state with stupor, coated tongue, tonsillitis, liquid stools, diffuse bronchitis, and broncho-pneumonia in both lungs; pulse 150, temperature 102·6°F. On the tenth day prostration was more pronounced. Blood-culture and positive agglutination showed *B. paratyphosus* B. On the last day (eleventh) some meningeal symptoms (convulsions and nuchal rigidity) were noticed; temperature 105·8 °F. *Autopsy:* Extensive broncho-pneumonia in both lungs; rickets; no pathological changes in gastro-intestinal canal. *B. paratyphosus* B was cultivated from the heart blood; positive agglutination.

This case was a rare example of paratyphoid fever with a morbilliform eruption.

Case 9.—An anæmic and very rickety girl, aged 2½ years. The illness began with whooping-cough, during which time measles, complicated with double purulent otitis media, occurred. After the temperature had been normal for one day, fever set in and continued until death on the tenth day. In the last seven days diarrhœa, bronchitis, and broncho-pneumonia were observed. *B. paratyphosus* B

was cultivated from the blood and the stools; positive serum reaction. *Autopsy*: Severe rickets; broncho-pneumonia; gastro-intestinal canal completely normal. *B. paratyphosus* B was again isolated from the heart blood; positive agglutination.

This was an instance of mixed infection of whooping-cough, measles complicated with purulent otitis media, and paratyphoid fever.

The last infection proved fatal to the child, weakened by the two previous diseases.

Case 10.—A feeble, pale, badly-nourished girl, with severe rickets, aged 2 years. The illness began suddenly with dyspnœa. On admission to hospital on the fourth day broncho-pneumonia was found in the left lung and on the next day in the right also; von Pirquet reaction was positive. Leucocytes 7000. Temperature 97°, 104·4°, 106·2° F.; pulse 170. *B. paratyphosus* B was isolated in pure culture from the blood. On the ninth day of the illness weakness, dyspnœa, and cyanosis increased, and death took place. *Autopsy*: Confluent broncho-pneumonia in both lungs; tuberculosis of bronchial glands; severe rickets. Gastro-intestinal canal normal. At the autopsy the paratyphoid B bacillus, pneumococcus, and *Staphylococcus pyogenes aureus* were isolated from the bile as well as from the blood. The pneumococcus was also cultivated from the lungs.

In all probability this was a case of mixed infection with broncho-pneumonia from the first.

Case 11.—A male infant, aged 1 year, was admitted to hospital with cyanosis, dyspnœa, bronchitis, signs of pneumonia, enlarged spleen, and meteorism. During the last two days meningeal symptoms appeared, and tubercles were diagnosed in the choroid. Temperature between 98·6° and 102·3° F. Leucocytes 29,500, 23,700, 27,000, 29,800. Death from tuberculosis on the eleventh day after admission. *Autopsy*: Acute miliary tuberculosis. Nothing abnormal in gastro-intestinal canal. Blood-culture and positive agglutination showed *B. paratyphosus* B.

This was in all probability a case of miliary tuberculosis with paratyphoid as a secondary infection.

Thus, we see that pathological changes in the gastro-intestinal canal in children were observed only in the first 7 of our cases; in the 4 other cases no pathological lesions were found in the gastro-intestinal canal. In the first 6 cases, in which follicular enteritis was observed at the autopsy, it was severe only in Cases 4 and 5. In Case 7 swollen Peyer's patches and solitary follicles, *i. e.* changes like those in the first week of typhoid fever, were found. Swollen mesenteric glands were found in Case 2; enlarged spleen only in

Case 6; broncho-pneumonia in 8 cases. Mixed infection was observed in 8 cases.

In the literature we could find only the following cases of post-mortem examination of children with paratyphoid fever:

In Vagedes' case of a boy, aged 14 years, swollen Peyer's patches were noticed. In the case of Count and Kirby, of a baby, aged 4½ months, swollen lymphatic glands in the small intestine, enlargement of the spleen, and swollen mesenteric glands were found. In two cases of Arzt and Boese in a 7 weeks old baby, in one 5 months old, with signs of cerebro-spinal meningitis, diffuse catarrh of the intestine with slight enlargement of the Peyer's patches and solitary follicles were observed post mortem; positive agglutination was found in only one case.

Wollenweber, Dorsch, and Matthes described a case of paratyphoid B in a child, aged 2½ years, in which swelling of the gastric mucosa, slightly swollen solitary follicles in the intestinal canal, and slightly enlarged spleen were present. In Inoue's case in a child, aged 10 years, swollen follicles in the intestine, and especially in ileo-cæcal part, and slightly enlarged spleen were found. In Breunig's case in a child, aged 1 year and 3 months, with enteritis and meningeal symptoms, enteritis, especially of the colon, and slightly enlarged solitary follicles and mesenteric glands were observed. In Mayerhofer's case, in an infant, aged 5½ months, enteritis and swollen mesenteric glands were found. In Longer and Thomann's case, in a boy, aged 7 years, severe gastro-enteritis and nephritis were observed. In Rings' case, in a girl, aged 8 years, perforation of the appendix, pus in the abdominal cavity, swollen mesenteric glands corresponding to the cæcum and ileum and enlargement of the spleen were found. In Trautmann's case, in a boy, aged 9 years, swelling of the mucous membrane of the intestine was found; the autopsy took place four days after death; *B. paratyphosus* B was isolated from the spleen. In Appiani's case, in a boy, aged 8 years, swelling of the mucous membrane of the small intestine, some swollen Peyer's patches, acute nephritis, and enlargement of the spleen were observed. Baginsky's first case, in a girl, aged 4½ years, showed (*a*) in the colon swollen Peyer's patches and solitary follicles, some of which were ulcerated; (*b*) parenchymatous hepatitis, myocarditis, etc.

This case is not sufficiently proved: *B. paratyphosus* B was obtained at the autopsy, and the serum reaction during life was twice negative. In the second case of Baginsky, in a girl, aged 2 years, pathological changes like those of septicæmia were noticed;

B. paratyphosus B was isolated from the blood as well as from the pus of one abscess. In Jochmann's case, in a girl, aged 7 years, with scarlatina, streptococci and *B. paratyphosus* B were obtained; the autopsy showed enlargement of the spleen and mesenteric glands. In the case of Eckert, in an infant, aged 9 months, nodular enteritis, purulent otitis media, purulent meningitis, and enlarged liver were found; streptococci and *B. paratyphosus* A were isolated from the blood. In the case of Hetsch there was no proper autopsy. In the cases of Papenheimer and Bonhof no pathological changes in the gastro-intestinal canal were found. In the cases of Appiani, Baginsky, Jochmann, and Eckert paratyphoid infection was a secondary one.

A study of the results of post-mortem examinations of paratyphoid cases in children and adults, including those reported in literature and our own cases, shows that the morbid changes have been observed resembling (1) typhoid fever; (2) acute enteritis, acute gastro-intestinal catarrh, or acute gastritis, etc.; (3) dysentery; (4) those of a transitional form, *i. e.* inflammation of the intestinal lymphatic apparatus (swollen follicles and Peyer's patches, etc.); (5) septicæmia. In some cases no changes in the gastro-intestinal canal were found.

It may be mentioned here that not only in paratyphoid fever, but also in typhoid, especially in children (even in cases of long duration), characteristic pathological changes in the intestinal canal are not always present. We have not been able to find a single recorded case of proved paratyphoid in a child in which the lesions, at the autopsy, resembled those typical of typhoid fever.

Intra-uterine Infection with Paratyphoid Bacilli.

In paratyphoid fever as well as in typhoid, and, as one of us (Stolkind) observed, in relapsing fever, an interruption of pregnancy may occur. The *B. paratyphosus* may pass from the mother's blood to the fœtus (intra-uterine paratyphoid infection). We shall briefly describe our case of intra-uterine infection with *B. paratyphosus* B in the blood of a newborn child.

Case 12.—A baby was born after premature instrumental delivery. The weight of the child was a little over 4 lb., and its length $18\frac{4}{5}$ in. The baby died after nineteen hours from debility. At the autopsy only hyperæmia of epiglottis was observed; all the other organs were normal. The blood-culture and positive agglutination (1 : 16,000) showed *B. paratyphosus* B. The mother, a woman aged 44 years, had had acute gastro-enteritis with fever some time before.

In the literature we could find only the following analogous cases:

In Nauwerk and Flinzer's case the baby died of melæna neonatorum thirty-six hours after birth. At the autopsy, slight enlargement of the spleen, swelling and redness of the gastric mucosa with numerous erosions, hæmorrhagic diathesis, etc., were found. Paratyphoid B bacilli, staphylococci, and *B. coli* were isolated from the blood; positive agglutination.

Schmidt isolated from the blood of an infant, on the first day of its life, *B. paratyphosus* B and streptococci, and on the fifth day (*i. e.* last) *B. paratyphosus* B from the stools and from the heart blood. Agglutination was negative; the mother had paratyphoid B.

Yamada and Doi obtained *B. paratyphosus* B from the heart blood, spleen, and intestine of a fœtus; the mother had paratyphoid B.

The Clinical Forms of Paratyphoid.

As the result of his own observations and a study of almost all the original articles in the English, American, French, Russian, Italian, and German literature, one of us (Stolkind), many years ago, adopted the following clinical classification: (1) The typhoid form; (2) the gastro-intestinal form; (3) choleraic form; (4) respiratory or influenzal form. We must add that the clinical classification of paratyphoid, as in most other diseases, is (1) schematic; (2) mostly based not only on pathological, but also on clinical symptoms; (3) that it is not rare to find atypical cases or transitional forms in which the illness begins with a combination of two of them or with one form, which changes later into another one. There may be various types of paratyphoid fever—ambulatory, abortive, mild, severe, etc.

Sometimes paratyphoid fever may resemble malaria (Carducci, Stolkind), septicæmia, etc.

Besides the four principal forms we also meet with paratyphoid infection of separate organs, which may be called, for example, appendicitis paratyphosa, cystitis, pyelitis, or cystopyelitis paratyphosa, cholecystitis paratyphosa, meningitis paratyphosa, spondylitis paratyphosa, etc. (*vide* our Cases 21 and 22).

Paratyphoid fever may appear also as a secondary disease, as in Case 11, and in cases reported by Baginsky, Jochmann, Schottmüller, etc.

I. *Typhoid Form of Paratyphoid Fever.*

The following cases of ours are examples of this form:

Case 13.—A boy, aged 1 year. The illness began with measles, but after the disappearance of the measles eruption the temperature did not fall and remained high for seventeen days. During

this time the child showed a typhoid state, diarrhœa, and meteorism for some days, and an enlarged and palpable spleen. No rose spots. The clinical diagnosis was measles and typhoid fever. But in the third week of the second infection paratyphoid B bacilli were isolated from the blood, and there was a positive Widal's reaction with these as well as with laboratory bacilli. The illness ended by lysis in the course of a week.

The clinical symptoms even during the same epidemic may vary, just as was the case with the following six children in the same family:

Case 14.—A girl, aged 11 years. The illness started about six to seven days before with great lassitude, nausea, vomiting, and headache. Slight bronchitis. Leucocytes 11,200. The fever (100°–102·6° F.) lasted about fifteen days. Blood-culture showed *B. paratyphosus* B.

Case 15.—A boy, aged 4 years. About eight days previously the mother noticed anorexia, somnolence, apathy, and nausea. Typhoid state with slight stupor; positive diazo-reaction; blood-culture showed *B. paratyphosus* B. Leucocytes 6100. The fever lasted about ten days.

Case 16.—A girl, aged 1½ years, fell ill about seven days before admission to hospital with general weakness, anorexia, diarrhœa, fever, etc. Slight ileo-cæcal gurgling and bronchitis; typhoid state and irregular temperature for fifteen days. Blood-culture showed *B. paratyphosus* B.

Case 17.—A boy, aged 12 years. Typhoid state and fever for about eleven days; slight ileo-cæcal gurgling; positive diazo-reaction. Leucocytes 5000; bradycardia, *e. g.* pulse 64 to 68, with a temperature of 101·1°–101·5° F.

Case 18.—A boy, aged 4 years. Slight typhoid state, two rose spots. Leucocytes 5800; fever lasted about ten days.

Case 19.—A boy, aged 8 years. Mild typhoid state with stupor; slight bronchitis. Leucocytes 6000; the fever lasted about ten days; bradycardia only during one day (pulse 68, temperature 100·9° F.).

The illness began in all the six children gradually with general weakness, headache, anorexia, and lassitude, followed by a typhoid state. A typhoid state and diarrhœa were observed in Case 16 only. Nausea was observed in 2 cases; nausea and vomiting in Case 14; rose spots (two only) in 1 child; ileo-cæcal gurgling in 2; bronchitis in 3; irregular temperature in 1. The fever lasted from ten to fifteen days, ending by lysis in two to three days. Pronounced bradycardia was found only in the boy aged 12 years and during one

day in Case 19. There was a positive diazo reaction in 2, leucopenia in 5. *B. paratyphosus* B was isolated from the blood of 3 children; the cultures from the blood of the other 3 cases remained sterile; the cultures from the fæces and urine were sterile in all 6 cases. Widal's serum reaction with the bacilli isolated from the blood of three of these children, as well as with laboratory ones, was positive in all six children at the beginning of the fourth week, being negative in the second week.

Cases of the typhoid form of paratyphoid have been described by many authors (Schotmüller, Lentz, Konrich, Stolkind, etc.).

II. *Gastro-intestinal Form of Paratyphoid Fever.*

The symptoms of this form simulate acute gastro-intestinal catarrh, acute enteritis, follicular enteritis, or dysentery, and in exceptional cases acute gastritis. Cases of paratyphoid in young children, with symptoms like enteritis, are described above (*vide* Cases 1–8). In one of our cases vomiting with abdominal pain and perspiration were the principal symptoms in the first days of the illness. Lentz described a case of paratyphoid B in a baby, aged 14 days, who was infected by his sisters, and in whom vomiting was the predominating symptom in the course of the illness. In many of our cases, as well as those of other authors, the illness began suddenly with vomiting, nausea, diarrhœa, fever, sometimes with pains in the abdomen, limbs, shivering, etc. In young children a convulsion sometimes occurs at the onset. In some cases the illness begins with signs of gastro-intestinal catarrh, which later disappear, and the predominant symptoms then resemble those of typhoid fever.

We will describe here a case of paratyphoid B, which at the beginning of the illness, before bacteriological examination, one of us (Stolkind) diagnosed as dysentery. This case we believe to be up to the present the only one on record of a child having paratyphoid being infected by measles; but in the cases reported by other authors, as well as in other cases of ours, the contrary took place, *i.e.* paratyphoid appeared during measles.

Case 20.—A weakly boy, aged 1 year, was suddenly attacked with fever and diarrhœa (liquid, green stools with mucus). On the second day there was frequent desire to go to stool, with straining, tenesmus, with mucus and blood, and afterwards with blood and pus in the stools, prolapse of the rectum, great apathy and weakness, bronchitis, and slightly enlarged spleen and liver. Positive diazo-reaction; leucocytes 11,500. On the fifth day of the illness *B. coli* only was found in the stools; from the eighth day of the illness till

the period of recovery from the complications of the second infection (measles) only *B. paratyphosus* B was found after repeated bacteriological examination. In the period of recovery only *B. coli* was isolated again. Widal's serum reaction was positive with the child's paratyphoid bacilli, as well as with the laboratory ones. Blood and pus disappeared from the stools on the twenty-third day, and diarrhœa ceased the fortieth day. On the eleventh day of the "paratyphoid dysentery" the baby, who began to improve, was infected with measles, and fourteen days later all the typical symptoms of measles appeared, viz. laryngo-tracheitis, bronchitis, conjunctivitis, characteristic eruption, high fever for nine days, etc. This was followed by various complications, viz. very severe ulcerative stomatitis, pneumonia, heart failure, and myocarditis, with dropsy of the legs, very great enlargement of the liver, etc. Convalescence was established after twelve weeks.

In another of our cases of acute dysentery numerous *Amœbæ dysenteriæ* in the fæces were found during life, and post mortem pure cultures of *B. paratyphosus* B were isolated from the blood, the pus of the spleen, and abscesses of the liver; positive agglutination (1 : 16,000). The autopsy showed dysentery (amœbic colitis) with metastatic abscesses of the liver and kidneys, enlargement of the spleen, and degeneration of the myocardium. Afterwards Nishino reported a case of diarrhœa with blood and mucus in a boy, aged 8 years, with *B. paratyphosus* B in the fæces.

III. *The Choleraic Form.*

This form closely simulates cholera nostras or cholera Asiatica. For example, in one of our patients the illness began with great lassitude, vomiting, and very frequent liquid stools, which later assumed the rice-water appearance. The patient presented great apathy, dry skin, cold and cyanotic extremities, husky voice; temperature, 99° F. on the third day, and 98·2° F. on the fourth day; very painful cramps in the calves, very weak pulse, and heart-sounds. No *Vibrio choleræ*. *B. paratyphosus* B (almost in pure culture) was isolated from the fæces and urine. Complete recovery.

In our other cases abdominal pains, cramps in the arms and calves, sunken face and eyes, stupor, etc., as in cholera or cholera nostras, were observed. But instead of *Vibrio choleræ*, *B. paratyphosus* B was found. Analogous cases were described by Lentz, Hetsch, Gaffky, Jacobson, Bracht, Kutscher, Stolkind, Schottmüller, Berger, Baur, Mayer, etc. The case of Mancini of paratyphoid and cholera in a boy, aged 14 years, is not proved.

IV. *Influenzal or Respiratory Form.*

Many years ago one of us (Stolkind) described a special form of paratyphoid fever, which he proposed to call the *influenzal form* (*respiratory paratyphoid*), and which clinically does not differ from respiratory influenza. His first case showed a sudden onset with coryza, cough, sore throat, headache, lassitude, and moderate fever; later appeared slight enlargement of the spleen, several spots on the abdomen, and irregular fever for two weeks. Bacteriologically, it was found to be paratyphoid B (Pfeiffer's influenza bacillus was absent). In another case the illness began suddenly with shivering, headache, great malaise, conjunctivitis, coryza, sore throat, and bronchitis; later, the course of the illness was more like typhoid fever. In another case the illness began suddenly with sore throat, tonsillitis, laryngitis, diarrhœa, abdominal pain, etc. In another case there was a sudden onset with broncho-pneumonia. Such cases of respiratory paratyphoid were also observed by other authors—Allen, Baer, Beliaiev, Grenet and Fortineau, Lentz, Miller, Reuss and Schiller, Rimpau, Wilucki, etc. In the case of Beliaev (paratyphoid B) the illness began with coryza, sore throat, cough, bronchitis, fever, etc. Miller observed many cases of respiratory paratyphoid in English soldiers. Wilucki observed seven cases of paratyphoid B in which the illness began suddenly with shivering, fever, lassitude, coryza, sore throat, bronchitis, conjunctivitis, headache, etc. Wilucki, etc., call this form of paratyphoid "influenza paratyphosa Stolkind."

Local Infection.

The following two cases illustrate this variety:

Case 21.—A girl, aged 15 years, was admitted to hospital with an attack of eclampsia at the beginning of labour. After the birth of the child she had fever (remittent and intermittent) for thirty-one days. Later two relapses were observed, with remittent and intermittent fever (104° and 104·5° F.), lasting six and fifteen days, with apyrexial intervals of sixteen and thirteen days respectively. Repeated blood-cultures remained sterile. Leucocytes and *B. paratyphosus* B were discovered in the urine. Agglutination was positive with the patient's bacilli (1 : 5000) as well as with laboratory ones (1 : 1250). Complete recovery took place after three months, but the patient remained a carrier of *B. paratyphosus* B in her urine.

Case 22.—Boy, aged 17 years. The illness began suddenly with fever and severe pain in the region of the right kidney. There were bronchitis, leucocytosis (11,000 to 22,000), pain, malaise, and remit-

tent and intermittent fever for more than three weeks. A pure culture of *B. paratyphosus* B was isolated from the urine. This case of pyelitis paratyphosa was discharged from hospital as a carrier of *B. paratyphosus*.

Analogous cases were reported by Schottmüller, W. Drought and Kennedy, etc.

Mixed Infection.

In paratyphoid fever, just as in many other infectious diseases, one or more other infections may appear simultaneously.

We have already described many examples of the kind, viz. paratyphoid with measles, scarlatina, diphtheria, chickenpox, whooping-cough, tuberculosis, amœbic dysentery, etc. In one of our cases, at first Flexner's *B. dysenteriæ* and later *B. paratyphosus* A were isolated from the stools; in another case, *B. paratyphosus* B and *B. emphysematosus* were found. Many such cases have been reported by other writers. We could not, however, find in literature a single genuine case of mixed infection of paratyphoid and typhoid in a child. The cases described by Beckers, Mori, Watt, etc., were examples of a simple typhoid or paratyphoid infection with coagglutination or accidental presence of typhoid bacilli in cases of paratyphoid and *vice versâ*. The following was an example of coagglutination by paratyphoid: In one of our cases of the typhoid form of paratyphoid B. the *B. paratyphosus* was at first isolated from the blood and was absent in the fæces and urine. Two days later it was cultivated from the rose spots and was absent in the blood. Widal's serum reaction was positive (1:80) on the twelfth day with *B. typhosus* only, on the nineteenth day with *B. typhosus* (1:80) and with the patient's own *B. paratyphosus* (1:640), on the forty-seventh day with his own bacilli (1:1660) and with *B. typhosus* (1:50).

Ætiology.

We will now mention some peculiarities of the ætiology of paratyphoid fever. The *B. paratyphosus* can live in dry sand not more than eight hours, and in moist sand more than sixty days (Bitter). It dies in a temperature of 76·6° to 100° C. after a short time. According to Rondoni it cannot live in the sun for four hours. Mayer found it still viable in dry fæces kept in a dry and dark place for one and a half years. Paratyphoid bacilli have been found in water (Brinckmann, Conradi, Mayer, Paladino-Blandini, Prigge, Sacquépée, and Chevrel); in ice (Conradi, Rommeler); in milk (Hübener); and in boiled meat sausages (Uhlenhut and Hübener).

In one of our cases the patient was probably infected through swallowing pieces of ice. Paratyphoid infection occurs generally either through contact with acute, temporary, or chronic carriers, or through food, drink, etc., infected by them directly or indirectly. Paratyphoid infection through contact was, for example, observed in two of our patients, who lived in the same room and who afterwards infected their nurse, in Cases 4, 5, and in Cases 14–19. Cases of contact infection were reported by Blühdorn (in a breast-fed infant, aged 12 weeks), Fortineau and Riberau (in a child, aged 4 months), and by Hillgermann, Prigge, Sachs-Mücke, Fornet, Krause, Rimpau, etc. Cases of paratyphoid infection by intestinal or urinary carriers were described by Lentz (in a child, aged 6 years), by Rimpau (in a boy, aged 13 years, and a child, aged 10 years, infected by his mother), and by Ustvedt (infection of many school children by a woman servant, who was an intestinal carrier), etc. Some of our patients remained carriers (*e. g.* Case 21, a urinary carrier). Carriers of paratyphoid bacilli have been reported by Bainbridge and Dunfield, Clemens and Galvey (paratyphoid A urinary carrier), Conradi, Firth, Gaetgens, Grattan and Wood, Harvey, Hilgermann, Kayser, Küster, Raichman, Porter and Tromsdorf, etc. The monographs of Ledingham & Arkwright and Stolkind should also be consulted. Epidemics of paratyphoid fever through food infection were described by Bernstein and Fisch (sixty persons through eating pie); Curschmann (twenty-two persons through pudding); Jacob (through sausages); Kutscher (ninety cases through infected meat); Langer and Thomann (eleven persons through flour); Levy and Fornet (through gruel with vanilla); Mosenbach and Schmidt (through pie); Prigge (through cake); Quadflieg (203 cases); as well as Tromsdorf, Raichman and Porter (more than 100 cases through pork pies); Vagedes, as well as Walker (through cake), etc.; Fischer, Ustvedt, etc. (contaminated milk); many other authors through cheese, fish, etc.

Experiments on animals (Fraenkel and Much, Metchnikov and Besredka, Ribadeau-Dumas and Harvier, Siciliano, etc.), as well as clinical observations, show that *B. paratyphosus* can escape from the carriers by the fæces, urine, and pus, and can infect food, milk, etc., and by these means or by infected hands can infect another person. The paratyphoid bacilli gain entrance in all probability through the mouth, and are detained partly in the tonsils and pharynx (thus giving rise to sore throat, respiratory paratyphoid, etc.), then pass into the blood and the lymphatic apparatus of the intestinal canal and other organs.

The clinical symptoms will largely depend upon the means by

which the paratyphoid bacilli are introduced, upon the quantity and quality of the bacilli (virulence, type, etc.), their toxins, individuality (immunity, predisposition, strength, etc.).

Symptomatology.

The incubation period varies from two to seven days; it is seldom longer, and only in some cases of so-called food poisoning it may last even less than twenty-four hours. The onset may start abruptly, or more often gradually. A typhoid state was observed in nearly 25 per cent. of our cases, and in those of other authors to a more or less degree. The typhoid form of paratyphoid occurs in infancy generally with the same symptoms as in typhoid fever. But this form, which is mostly mild, not infrequently presents certain peculiarities which are exceptional in cases of typhoid, as, for example, nasal and labial herpes, perspiration, sudden onset, with very high temperature from the first, initial shivering, etc. In young children convulsions instead of shivering may sometimes be observed. Herpes labialis or nasalis seldom occurred in our cases, or in those of Ring's, etc., but other authors (Lentz, Cannata, etc.) have observed it more frequently.

Perspiration may occur in the first few days and last during the entire illness. In one of our cases of paratyphoid B, in a boy, aged 6 years, with malaise, headache, swollen cervical glands, 13,000 leucocytes, fever during fifteen days, etc., extreme perspiration was observed during the whole illness. Perspiration was also noticed in many other cases of ours, as well as of those of other authors (Lentz, etc.). Sometimes sudamina appear. The form of typhoid, described as "sudorale" by Jaccoud, probably was paratyphoid fever or a mixed infection of influenza and typhoid fever (Stolkind), or malaria and typhoid (Laveran, Lashkevich, etc.).

An eruption may occur in every clinical form (in about 50 per cent. of our cases). As a rule, it appears at the end of the first week or during the second, but in rare instances during the first days of the illness, or during the third or even the fourth week (in one of our cases on the twentieth day). There may be only a few rose spots (in one of our cases there were only two rose spots), or plenty on the abdomen or on the whole body (in one of our cases it was like typhus). The rash may in some cases resemble urticaria, scarlatina, or measles (*vide* Case 8), as in some of our cases, as well as in those of Konrich, Lentz, Meslay and Coville, Schottmüller, etc. In some instances it may be difficult to decide whether the rash is caused by paratyphoid itself or by mixed infection of paratyphoid

with measles, scarlatina, etc. The following case of ours is an example:

Case 23.—A boy, aged 2 years and 9 months. The illness began with measles, and six weeks later a new, severe, mixed infection (paratyphoid fever, scarlatina, and diphtheria) occurred. Diphtheria bacilli and streptococci (erysepelatosi) were cultivated from the nose and tonsils; antitoxin treatment. On the next (sixth) day complete stupor, Cheyne-Stokes' respiration, etc., were observed; an eruption appeared on the arms and the face and on the following day on the greater part of the trunk. It was difficult to say if this rash indicated the paratyphoid infection or the "serum disease."

Repeated blood-cultures showed in the first nine days *B. paratyphosus* B, but later they remained sterile. The following complications took place: Much loss of tissue of the hard and soft palate, severe collapse, hæmorrhagic nephritis (thirty-fourth day), and pneumonia (fifty-fifth day). Complete recovery took place.

The temperature is nearly always raised, and only in the choleraic form it may be normal or even subnormal. The duration of the fever varies from a few days to eight and even more weeks; generally the fever lasts from one to three weeks. The temperature curve may be like that of typhoid fever or irregular and even intermittent, as in malaria. In one case of paratyphoid B described by one of us (Stolkind) in a boy, aged 12 years, the temperature was 98·6° to 99·1° F. in the morning and 101·8° to 104° F. in the evening during twenty-two days, and perspiration often occurred. No *Plasmodium malariæ* was found.

The fever is more liable to terminate by lysis, and generally in two to three days, though it may end not uncommonly by crisis in one day.

Abdominal distension is observed generally as a result of unsuitable food. Ileo-cæcal gurgling is frequent. Not infrequently we found abdominal pain and tenderness. There may be constipation in the early days of the disease or in the period of convalescence. In one of our cases coprostasis was observed in convalescence.

Enlargement of the spleen occurred in nearly 50 per cent. of our cases, and sometimes from the first. The liver was swollen in a few of our cases, and generally in patients with a weak heart.

Bradycardia and dicrotic pulse are not very frequent in children. Leucopenia, which was observed in many of our cases, often varies in the course of the illness. Thus the leucocyte count in one of our cases of paratyphoid B in a girl, aged 15 years, with pulmonary tuberculosis of the right apex, was, on the seventh day, 5200;

on the eighth and ninth, 4000; on the tenth, 7000; and on the twelfth, 3800. The diazo reaction is not frequent. Considerable loss of hair is a rare sequel. Relapses were seldom observed by us or by other authors; they are usually without complications, and usually resemble an ordinary attack of paratyphoid fever.

Complications.—We observed in our cases of paratyphoid various complications, *e. g.* tonsillitis, abscess of the tonsils, phlegmon of the palate, swollen cervical glands, laryngitis, tracheitis, bronchitis, broncho-pneumonia, pneumonia, pleurisy, and empyema (with paratyphoid B bacilli in the fluid), pulmonary infarction, endocarditis, myocarditis, venous thrombosis, and purulent thrombophlebitis of the femoral vein, retention of urine, cystitis, nephritis, meteorism, jaundice, intestinal hæmorrhage, appendicitis (in one case gangrenous appendicitis and purulent peritonitis), ptosis, delirium, psychoses, epileptiform attacks, meningeal symptoms, external hydrocephalus, abscesses of the skin (with *B. paratyphosus* in the pus), inguinal bubo, arthritis of the wrist joint and interphalangeal joints (in one case), purulent otitis media (with *B. paratyphosus* B in the pus), parenchymatous degeneration of many internal organs, etc. One of our cases, a child, aged 3 years and 9 months, showed spondylitis paratyphosa.

Our own cases, as well as those described by other writers, show that paratyphoid fever presents the same complications as typhoid fever. The following complications in children have been described by other authors: Paratyphoid bacilli were isolated by Achard and Bensaude from a sterno-clavicular abscess in a child, aged 6 months; by Breunig from the shoulder-joint of a six months old baby; by Aoki from osteomyelitis of humerus in a child, aged 1 year; by Kapsenberg from an abscess of the shoulder in one year old child; by Frank from the pleuritic fluid in a child, aged 2 years; by Walther from the pus of appendicitis in a girl, aged 13 years; by Nauwerk and Flinzer from the pus of otitis media in an infant 36 hours old. Other complications were described by Doelemann (a doubtful case of "arthritis serosa sinistra" in a 3 months old baby), Tillgren and Troell ("arthritis tarsi paratyphosa" in a boy, aged 6 years; also a doubtful case), and Fried ("spondylitis paratyphosa"; also doubtful). Cases of meningitis or meningism were reported by Boycott (in a child of 20 months), Gohn (two cases), Arzt and Boese (*vide* morbid anatomy), Incan (in a boy of 4 years), Sironi ($2\frac{1}{2}$ years old boy), Boonacker and Gorter (in a baby 8 months old).

Other complications in children have been reported by Rings,

Stolkind (enlarged cervical glands); icterus (Vaglio), nephritis (Langer and Thomann), and purpura hæmorrhagica (Job, etc.).

Diagnosis.

The diagnosis of paratyphoid fever, as in other infectious diseases, must be based first on clinical symptoms. Clinically, it is possible to diagnose paratyphoid with the same probability as typhoid fever, influenza, malaria, etc. The possibility of paratyphoid must be borne in mind in the following conditions: (1) In so-called "food poisoning," which in the great majority of cases is caused by *B. paratyphosus* or *B. enteritidis*, Gaertner, or *B. suipestifer*; (2) in acute enteritis, or gastro-intestinal catarrh, or cholera nostras, or cholera, or dysentery; (3) in infectious diseases with symptoms resembling typhoid fever; (4) in cases with symptoms of respiratory influenza (coryza, sore throat, laryngitis, etc.).

In diagnosing paratyphoid we must also take into consideration cases in which there are clinical symptoms of septicæmia, malaria (Carducci, Stolkind, etc.), incipient tuberculosis, etc. The diagnosis of paratyphoid is only certain when we have symptoms of one of the above-mentioned clinical forms and when it is proved bacteriologically. In some of our cases of paratyphoid the determination of the opsonic index was of diagnostic value, as had been shown by Much and Schottmüller, Zlatogorov, etc.

Respiratory paratyphoid sometimes resembles a mixed infection of typhoid and influenza (Stolkind). The possibility of paratyphoid infection must also be borne in mind in cases of cystitis, pyelitis, cholecystitis, etc.

Prognosis.—The prognosis is good. The mortality is from 0 to 3 per cent., seldom more; it mostly depends upon complications.

Prophylaxis.—For the prophylaxis of paratyphoid fever (as well as of typhoid) it is necessary either to prevent the healthy person from contracting the infection or to make all the carriers innocuous. But at present we do not possess either a specific immune serum or a specific to destroy *B. paratyphosus* in the carriers. On the immunisation of animals the articles by Basseches, Bidault, Franchetti, and Jamanouchi should be consulted. In his monograph on "The Ætiology, Prophylaxis, and Modern Treatment of Typhoid and Paratyphoid Fever," Stolkind has collected almost all the important remedies proposed for the destruction of the bacilli in carriers (diet, lactobacillin, radiography, antiparatyphoid inoculation, disinfectants, etc.); not one of these remedies proved to be of much use. In severe epidemics antiparatyphoid noculation is giving good

results (*vide* Berry, Mechnikov and Bezredka, Castellani, Kabeshima, Broughton-Alcock, Leishman, Sclavo, Vincent, Wright, etc.).

Treatment.—In the treatment of a case of paratyphoid the nursing, general hygiene, diet, and in severe cases drugs are of great importance. Generally we give liquid food. In mild cases of the typhoid and respiratory forms we allow the older children biscuits, cooked minced meat, etc. Alcohol (wine, brandy, etc.) should not be given in any case. If stimulants are needed, we use tea, coffee, caffeine, digitalis, camphorated oil, etc. In many of our cases of profuse diarrhœa, collapse, etc., repeated subcutaneous injections of normal salt solution ($\frac{1}{2}$–$1\frac{1}{2}$ litres) were of value. For abdominal distension proper diet is required. Turpentine proved absolutely useless in all cases.

For toxic meteorism as well as for bacteriotoxic paralysis of the vessels (with frequent filiform and irregular pulse, dyspnœa, general weakness, perspiration, pale or cyanotic skin, and sometimes collapse with fall of the temperature), subcutaneous injections of adrenalin with normal salt solution (six to ten times in twenty-four hours), caffeine and camphorated oil were sometimes of use.

Fever should be treated by hydrotherapy (baths not below 85°), sometimes pyramidon, antipyrin, etc., with caffeine. Urotropin, salol, etc., have no value in the prevention or cure of bacilluria. The same may be said of intestinal antiseptics (calomel, salol, benzonaphthol, etc.). Diarrhœa (if more than five stools in twenty-four hours, etc.), should be treated by proper diet, tannalbin, tannigen, bismuth, animal charcoal, and in severe cases opium should be given. For intestinal hæmorrhage injection of emetin, etc., is of use. Vaccines may be employed in severe cases.

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TUBERCULOSIS AS SEEN IN PUBLIC ELEMENTARY SCHOOLS.

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Even in a large area like that of the Staffordshire elementary administrative area, with over 80,000 children on the rolls, the numbers of tuberculous cases discovered at the routine inspections in the course of a year are not large. It seems a fitting opportunity to take stock of the total number of cases since the beginning of medical inspection in 1908.

Attention will be restricted in this paper to the "leavers." We conducted routine inspections of "leavers" from 1908 to 1915, since which year we have been unable to undertake any routine inspections whatever. In the early days "leavers" were differently defined in our so-called rural and urban areas. In the former areas a "leaver" was a child 12–13, in the latter a child of 13–14. After several years of study of the two denominations we came to the conclusion that there was too little difference between them to justify separate categories. Our rural areas are indeed genuinely rural, but our so-called urban areas are at most semi-rural. We have few or no real slum areas: our "urban" working-class townlets or hamlets are at worst but little fragments of a slum city, open on all sides to the free country air, and therefore less affected by the grosser evils of insanitation. In 1915 "leavers" everywhere, or more strictly speaking, children up for their final routine inspection, began to be defined as 12–13's.

Thus the children we shall deal with are those of 12–13 and those of 13–14. By 12–13 is meant a child who was 12 but not yet 13 on January the 1st of the year of inspection. Boys and girls were approximately equal in number at each inspection.

Since a child turned 12 but not yet 13 on January the 1st might be inspected on any day from January to December, it is clear that the average age of those we call 12–13's was not 12½ but 13. On the other hand, the average age of the 13–14's was 13½, since children in practically every case leave school by the time they are 14.

The cases we have enumerated as tuberculous may be taken to be almost all indisputably so. We have kept distinct and not included in the following figures the numerous cases of suspected tuberculosis. Every worker in the field of clinical tuberculosis during the last

twenty years has felt the tendency to sweep all manner of cases of ill-defined delicacy into the net of tuberculosis. There is sure to be a reaction; perhaps it has already set in. At any rate we have from the first kept separate the suspected cases from the cases whose well-marked and classical symptoms would have contented the physicians of twenty years ago, and it is these cases which alone are presented. For this reason, it may be mentioned, a group of cases of cervical glandular enlargement, of somewhat indefinite clinical import, belonging to the year 1914 (children 12–13), which may have been, as the inspector thought at the time, essentially tuberculous, but which also may not, have been omitted.

The inspecting staff remained practically unchanged from 1908 to 1913. It consisted of five members standardised by frequent consultations and mutual understandings of each other's ideals. But between 1913 and 1915 two of the original staff resigned, and the whole staff was increased from five to eight. It was, therefore, not so easy to secure complete uniformity in collecting the data in the later years.

The total numbers of children inspected during the years 1908–15, and the numbers of tuberculous cases of various categories detected among them, are set forth in the following table:

TUBERCULOSIS.

Children 12–13 *and* 13–14.

BOYS.

Years 1908-15.					
Age.	Number inspected.	Tuberculosis.			
		Lungs.	Glands.*	Bones and joints.	Other.
12–13 . .	14,191	26	29	22	4
13–14 . .	6935	10	21	3	2
Totals . .	21,126	36 = 0·170 %	50 = 0·246 %	25 = 0·118 %	6 = 0·028 %

GIRLS.

12–13 . .	14,724	32	52	14	5
13–14 . .	6891	19	32	10	2
Totals . .	21,615	51 = 0·236 %	84 = 0·407 %	24 = 0·111 %	7 = 0·032 %

Grand total inspected, 42,741.

* In consequence of the omission of a group of children under the heading of Glandular Tuberculosis from the 12–13's of 1914, the basic number for percenting is 20,277 in the case of boys and 20,635 in the case of girls.

It should be noted that we are dealing with *diseases* not *children*. Occasionally one child had two manifestations of tuberculosis; but no child in the 13–14 group had ever figured in the 12–13 group, and therefore no disease is counted twice over. It must be admitted that altogether we have not a number of tuberculosis cases sufficient for bold generalisations.

A glance at the tables suffices to show that, in general, girls suffer more from tuberculosis than boys. The numbers of boys and girls inspected are approximately the same. There are 283 cases of tuberculosis in all, of which 117 are boys and 166 are girls. The ratio of boys to girls, therefore, is 1 : 1·41, nearly 50 per cent. more girls proportionately than boys.

It is known, from the Registrar-General's Reports,* that the tuberculosis mortality of males at age 10–15 as compared with females is about as 52 to 82, which is sufficiently near our attack incidence in Staffordshire to give us confidence in the general accuracy of our figures.

If we take the cases of pulmonary phthisis alone, boys of 12–14 in Staffordshire showed 0·17 per cent. of cases and girls 0·236 per cent. The proportion of deaths from pulmonary phthisis of males at age 10–15 as compared with females, according to the Registrar-General, is about as 23 to 50.†

Comparison of the Tuberculous with the Average Child.

We examine all routine children according to a uniform plan and note the facts. At the end we can say that out of so many children examined a percentage had this or that ailment. When the numbers of children are sufficiently large the percentages tend to be remarkably constant in different homogeneous groups of children. The constitution of the child, plus the average risks of living in a given environment, determine a constant result. It is always of interest to see whether a group of children, having something peculiar in their constitution, or somewhat differently circumstanced, reacts in the same way as the generality or not.

The following tables show a comparison between the behaviour of average children and of children who are known with reasonable certainty to be infected with tuberculosis. In all other respects, except the suffering from tuberculosis, the average circumstances of the two groups are similar. The children are of the same ages. The two ages, 12–13 and 13–14, are thrown together, because we have never detected any difference of reaction between them. But

* *Loc. cit.*, p. xciii.

† Registrar-General's Report, pub. 1907, Supplement, p. xci.

attention must be called to an important difference between the contrasted groups in the matter of sex: while boys and girls are in substantially equal proportions in the entire group, their proportions in the tuberculous group are as 2 to 3. This will have to be allowed for.

Naturally in the matter of heights and weights the ages 12–13 and 13–14 are treated separately, and also the two sexes; but for many other purposes this is not strictly necessary, and, by combining, we get the advantage of greater numbers of the tuberculous and, therefore, steadier percentages.

We shall take the particular manifestations of tuberculosis separately so far as the numbers of cases make it worth while—viz. the pulmonary, the glandular, and the osseous (bones and joints).

Height and weight.—As standards we shall take the mean height and weight of our Staffordshire children as given in the Annual Report for 1912. The standards, while agreeing generally with those elsewhere used, show a few deviations which may be due to local differences of physique or to the fact that the conditions as to age, clothing, etc., were not precisely the same. In either case it is better to compare our own tuberculous with our own average children.

In the later years of medical inspection the weighing and measuring have been much less systematically carried out, mainly owing to the depletion of staffs. Hence, in some tuberculous groups the number of children of whom we have weight and measure is disappointingly small. The numbers are given in all cases at the head of each column.

Children of average age 13.

Boys.

	Staffs averages, 1909–11.	Tuberculosis.		
		Pulmonary.	Glandular.	Bones and joints.
Nos. dealt with .	**3412**	**12**	**12**	**12**
Height . . .	55·90 in.	54·60 in.	55.62 in.	55·39 in.
Weight . . .	75·32 lb.	66·54 lb.	73·25 lb.	73·86 lb.
W : H ratio . .	1·347	1·218	1·317	1·333

Girls.

Nos. dealt with .	**3475**	**9**	**21**	**6**
Height . . .	56·29 in.	56·83 in.	56·40 in.	53·79 in.
Weight . . .	77·70 lb.	69·90 lb.	77·71 lb.	69 30 lb.
W : H ratio . .	1·380	1·229	1·378	1·288

Children of average age 13½.

Boys.

	Staffs averages, 1909-11.	Tuberculosis.		
		Pulmonary.	Glandular.	Bones and joints.
Nos. dealt with .	2754	8	19	3
Height . . .	55·90 in.	57·50 in.	55·53 in.	57·00 in.
Weight . . .	77·55 lb.	80·87 lb.	77·88 lb.	78·08 lb.
W : H ratio . .	1·387	1·406	1·402	1·370

Girls.

Nos. dealt with .	2563	6	25	5
Height . . .	56·69 in.	55·70 in.	56·97 in.	54·65 in.
Weight . . .	81·15 lb.	73·25 lb.	81·70 lb.	78·40 lb.
W : H ratio . .	1·431	1·315	1·434	1·434

The above tables show that there is no constant differentiation of the tuberculous children from the average in height; sometimes the tuberculous groups have a higher mean height, sometimes a lower. And the same is true of the weight to height ratio : in the pulmonary group the ratio is certainly, in most cases, distinctly below the average, but not always (see boys 13½), while in the non-pulmonary groups the ratio is several times either above, or approximately the same as, that of the average. There is nothing to show that tuberculosis affects with any marked preference a type of child with low W : H ratio.

Incidence of the common infectious ailments.—We do not get a complete series of histories of previous illnesses with our children. Sometimes mothers cannot be got at, sometimes they have forgotten; but no selection is made, and, presumably, in the long run the omissions fall impartially on all groups. It seems probable that if to have had measles, whooping-cough, etc., in early life greatly predisposes to tuberculosis, this would tend to show itself in the case-histories. The following table enables us to see how far this is the case.

There is reason to believe that boys and girls are approximately equally liable to the common infectious ailments.

Thus the figures at our disposal give no reason to believe that previous attacks of the common infectious illnesses predispose to or favour the development of tuberculosis.

TABLE SHOWING INCIDENCE OF COMMON INFECTIOUS AILMENTS.

Children 12–14 (*Boys and Girls approximately equal*).
Years 1908–15.

	Entire group.	Tuberculous group.
Total inspected	**42,741**	**283**
Histories of .	Per cent.	Per cent.
Measles	49·05	43·81
Whooping-cough	17·91	19·08
Chicken-pox	11·01	8·48
Scarlet fever	9·55	6·00
Mumps	13·45	9·18
Diphtheria	3·01	2·12

Environment and tuberculosis.—There are certain facts noted of every routine child which go to illustrate the home conditions. How many dwelling-rooms are there in the home? Does the mother go out to work? Is the child's clothing ragged and dirty? Is the child verminous and unclean personally?

As to size of house and as to whether the mother is an outworker we cannot ascertain the fact in all cases, since we often cannot get at the parents, but, presumably, omissions to ascertain are scattered impartially over all groups in the long run.

It will be noticed that none of the above criteria is absolutely discriminative of the badly circumstanced child. The perfectly healthy, only child of a careful, newly-married couple may live in a three-roomed house. In half-timer districts it is often the capable, strong, managing mother with healthy children who goes out to work. Ragged clothing is sometimes, one might almost say, a personal fad of parents well enough off and otherwise attentive to their children; and nits in the hair are often seen in the case of the girls of quite respectable and well-intentioned mothers.

TABLE ILLUSTRATING THE EFFECTS OF ENVIRONMENT.

Children 12–14 (*Boys and Girls approximately equal*).
Years 1908–15.

	Entire group.	Tuberculous group.
Total inspected	**42,741**	**283**
	Per cent.	Per cent.
Mother an outworker	4·26	4·24
Homes of three rooms and under	6·69	8·12
Faulty clothing	7·53	6·71
Personally verminous	29·99	31·80

As the tuberculous group consisted of three-fifths girls and two-fifths boys, whereas the entire group consisted of equal proportions, and as girls always show a much larger proportion of personally verminous cases than boys owing to their long hair, the percentage 31·8 for the tuberculous group should be diminished somewhat to make it strictly comparable with the percentage of the entire group, 29·9. It is, however, evident on the face of it that the tuberculous group has no marked preponderance of verminous cases.

The basic numbers of the tuberculous group are so small, and the percentages therefore so precarious, that it will be better to take the above table in its entirety as suggesting that, at least in the predominately country conditions of Staffordshire, the occurrence of tuberculosis is not so much conditioned by particular environmental factors as is the case in large towns. Take the item of homes of three rooms and under (by which is meant not three bedrooms, but three rooms altogether). In towns overcrowding in one or two sleeping rooms, there seems to be no question, is closely associated with increased incidence of phthisis. In the above table, however, living in very small houses seems to have had little if any effect, which may simply mean that dwelling in three-roomed houses does not connote dangerous overcrowding to anything like the same extent in country areas as in populous towns.

Be that as it may, in general it would appear that the home conditions in the tuberculous group were not materially worse than the average.

Different Incidence of Various Ailments among the Tuberculous as Compared with the Average.

If a group of tuberculous children have an incidence rate for a certain ailment which is unmistakably higher than that of the totality of children examined, we are justified in concluding that there is some connection—either tuberculosis causes or promotes the ailment, or the ailment causes or promotes tuberculosis.

Though we have waited eight years for an accumulation of cases, the basic numbers of the tuberculous are still small for the purposes of such an investigation. There are only 283 cases. The basic numbers would be smaller still were we to separate boys (117) and girls (166), as, to be scientifically accurate, we ought to do, since many diseases fall unequally on girls and boys. It would, therefore, be pedantic to print the percentages in the case of all ailments, and a selection will be made of those conditions which have been thought to have some connection with tuberculosis.

Nose and throat ailments.—Adenoid overgrowths of throat and nasopharynx are often suspected to favour tuberculosis. At school inspections we deal with two conditions bearing on adenoid overgrowth, enlarged tonsils, and mouth breathing. A discussion of this latter as an index of nasopharyngeal adenoids is contained in the Annual Report on 1914, p. 38: sufficient to say, that the number of mouth breathers is an index and not an exhaustive enumeration.

Taking tonsils first. As we have never found any appreciable difference in the incidence of enlarged tonsils between boys and girls no correction of percentages is necessary. The 42,741 children of the entire group yielded 24·4 per cent. of enlarged tonsils, the 283 tuberculous children yielded 21·9 per cent. Considering the relatively small numbers of the tuberculous this must be regarded as a substantial agreement.

As regards mouth breathing a correction of the percentages is first necessary. At all ages girls have regularly a smaller number of mouth breathers than boys (see Annual Report on 1914, p. 105). The yield of cases among boys is, roughly, half as many again as among girls. Now the percentage of mouth breathers in the entire group is 9·01, and in the tuberculous group it is 8·83; but, as the latter group consisted of three parts girls (less affected) and two parts boys (more affected), whereas the entire group consisted of equal numbers of each, the mean percentage of the tuberculous group must be raised to make it strictly comparable with the mean percentage of the entire group. In fact, when the proper correction is made the percentages become practically equal.

There is, therefore, no evidence in our figures to support the belief that pharyngeal or nasopharyngeal adenoids favour tuberculosis in any marked degree.*

Small basic numbers call for great caution, but what may be claimed with perfect certainty for the figures thus quoted is that they prove beyond a doubt that mouth breathing and enlarged tonsils have no *dominating* influence or determining influence such as is sometimes ascribed to them in the production of tuberculosis. That they never act as a go-between cannot be asserted.

Thus Dr. Ruby Thomson, in a study of the mouth breathers of the three age periods, 5–6, 8–9, and 12–14, in the year 1911, estimated that, taking all mouth breathers together and making the correction necessitated by the different incidence of mouth breathing in boys

* In this connection reference should be made to the most interesting book of Dr. W. C. Rivers entitled 'Three Clinical Studies in Tuberculosis Predisposition' (London: Allen and Unwin, 1917). Dr. Rivers attacks the subject from the clinical side. His conclusions are in several particulars not supported by our observations.

and girls, the mouth breathers had proportionately half as many more cases of tuberculosis (all kinds) than the average of the entire group. But the total number of tuberculous cases in the whole of the 20,000 children she reviewed only amounted to 80. The mouth breathers in the same group numbered 2351. It is, therefore, not a very startling fact that the tuberculosis cases should in a particular year fall to the mouth breathing group in somewhat disproportionate numbers.

It may be well to indicate what is meant by a dominating or determining influence. If you take school children at large and are dealing with several thousands of children you will find that the proportion of those who are deaf is anything from 4 per cent. to 6 per cent. If you pick out the children who have, say, enlarged tonsils but are not mouth breathers, you will find that the proportion of deaf cases among them is still from 4 per cent. to 6 per cent. But if you pick out all the children who are mouth breathers, you will find that the proportion of deaf cases in the mouth breathing group runs up to 15, 20, 30, and even 40 per cent. This we have tested several times. Thus mouth breathing has an absolutely dominating influence in causing deafness.

Enlarged cervical glands.—We used to enumerate very carefully all cervical glands which were palpable, but we ceased to do this systematically after 1913, and our percentages, therefore, only refer to the years 1908–1913. This reduces the grand totals inspected. As we have never found any sex difference in the incidence of cervical gland enlargement the percentages need no correction.

The entire group of 25,081 yielded 11·8 per cent., the 145 tuberculous children yielded 58·6 per cent. This obviously indicates a connection between tuberculosis and enlarged glands, but about half the tuberculous children had tuberculous glands of the neck. Omitting these neck gland cases we have a remnant of 71 other tuberculous cases, and the incidence of cervical gland enlargement in them was 16·9 per cent., well above the 11·8 per cent. of the entire group. The basic figures are far too small for sweeping conclusions, but it may be pointed out that if we confine attention to the pulmonary cases alone the percentage of glandular enlargements is higher still. There were 34 pulmonary cases, and 10 of these showed cervical glandular enlargement, that is to say, 29·4 per cent. This seems outside the limits of error of small numbers, and must, we think, be taken to indicate a definite connection between cervical glands and pulmonary tuberculous infection.

Sound dentures.—Caries of teeth has been made responsible for

all diseases under the sun, and, among others, tuberculosis. We have never noticed any sex difference in the incidence of caries of teeth, so the percentages need no correction. For reasons which need not detain us, the examinees of one of our inspectors for one year are omitted; this reduces both the grand total inspected and the tuberculous group. The remaining grand total of over 40,000 children yielded 22·18 per cent. of children with sound dentures; the 269 tuberculous children had 26·39 per cent., or, in other words, the tuberculous as a group were even better off in respect of sound dentures than the average. The basic numbers of the tuberculous group are small, but certainly the percentages do not support the view that caries of teeth exerts any appreciable influence in promoting tuberculosis.

Nutrition.—Here there is a marked difference to the disadvantage of the tuberculous group, as is shown in the following table. We have never detected any difference between boys and girls in the incidence of sub-normal nutrition.

NUTRITION.

	Excellent. Per cent.	Normal. Per cent.	Bad. Per cent.
Entire group	3·62	78·33	18·03
Tuberculous	0·35	60·42	39·22

Anæmia.—Girls have more anæmic cases than boys at all ages. Taking the entire group of children 12–14 with whom we are dealing the boys yielded 9·25 per cent. and the girls 14·2 per cent., the average being 11·75 per cent. (the boys and girls in the entire group were about equal). Taking the tuberculous group the boys yielded 8·54 per cent. This is very nearly the same percentage as the boys in the entire group, but the basic numbers were small (117). The tuberculous girls (116), on the other hand, yielded 20·48 per cent.—a large excess. Making the correction due to the unequal number of boys and girls in the tuberculous group the mean or average of the group is 15·7 per cent., a considerable rise above the 11·75 per cent. average of the entire group.

The above are the main conditions associated in various theories with tuberculosis; but there are other conditions we may very naturally be curious about. For example the following:

Heart diseases.—It is known that girls are more liable to rheumatism than boys, and we have always found that they have organic heart lesions to a slightly greater extent. The disparity is somewhat greater in regard to functional disorders of heart.

But in both cases the difference is too slight to call for correction of the percentages. Organic heart disease in the entire group amounted to 2·8 per cent., in the tuberculous 2·12 per cent.; functional heart disorders in the entire group were 9·7 per cent., in the tuberculous they were 12·7 per cent. Considering the small basic numbers it probably means that there is no very marked interconnection.

Mental and nervous affections.—It is often remarked that tuberculous people are of a bright intellectual nature. It is believed also by many specialists that tuberculosis plays a part in weakening the germ plasm and giving rise to mental deficiency.* Both these statements receive confirmation from our percentages. Boys always yield more *dull and backward* children than girls, and, therefore, we must correct for this, since our tuberculous group has three girls for every two boys. The dull and backward in the entire group were on average of boys and girls 8·78 per cent., in the tuberculous group they were on average 2·76 per cent.

As to *mental deficiency*, there is also a constant excess of boys over girls. But as we have no mentally defective girl in our tuberculous group we will compare boys with boys. The 21,126 boys of the entire group yielded 0·56 per cent., the tuberculous boys 1·7 per cent. Thus, as a matter of fact, the tuberculous group had on this occasion a greatly disproportionate number of mental deficiency cases in it, but the basic figures and the number of cases in the tuberculous group are very small.

There was certainly no excess of other nervous ailments in the tuberculous group, there was no case at all of *infantile paralysis* or *chorea* as it happened, and *stammering, defective articulation* and *epilepsy* were in fairly equivalent percentages in the tuberculous and the entire groups.

Sense organs.—All *eye diseases* except perhaps squint tend to appear more frequently among girls than boys. This is especially true of defective sight. But in all the diseases except defective sight the difference of percentage is too slight to be taken into account for the purposes of our comparison. Making the necessary allowances for sex, this particular group of 283 tuberculous children showed an excess of percentage over the average in all cases except squint. The excess justified the belief, in spite of the small basic numbers, that the tuberculous have a greater tendency to eye diseases than the average, more especially to external eye diseases, including phlyctenular conjunctivitis and opacities. (See paper on

* Tredgold, 'Mental Deficiency.' London: Baillière, 1908, p. 20.

"External Eye Diseases of Elementary School Children," p. 201). The fact that there was no difference in the percentage of squint as between the tuberculous and the average is a point worth emphasising, since it has recently been maintained that consumptives are very liable to have squint, even to the extent of two or three times the average proportions.* Dealing with some 500 consumptives Dr. Rivers found the proportion of squints to be 1·2 per cent., whereas, taking some 900 persons gathered together and examined in a somewhat casual manner, he found the proportion of squinters to be only 0·4 per cent. All the cases were presumably adults.

Now the proportion 1·2 per cent. closely resembles what we have found with singular constancy to be the proportion of squinters in our children of school age 5–14. We have never detected any marked difference between boys and girls, but if anything girls have a slightly greater proportion. Taking boys and girls together to the number generally of about 20,000 children a year, our yearly percentages of squinters from 1908–1915 were as follows: 1·75, 1·26, 1·3, 1·3, 1·16, 1·2, 1·4, 1·4. Our experience is that a very small proportion of the squinters in the rank of life of our public elementary school children in ordinary circumstances ever get their squints thoroughly corrected, so Dr. Rivers's consumptive squinters were probably just above in average numbers. It is possible his control observation has misled him.

A tendency on the part of the tuberculous group to suffer from *ear diseases* is still more markedly shown, or may it be that ear disease opens another avenue for tuberculosis? We have no reason to think of any appreciable difference of incidence of ear disease in the two sexes, and, therefore, the percentages need no correction. The entire group of children yielded 5·2 per cent. of cases of defective hearing in one or both ears, the tuberculous group 8·8 per cent. The entire group had 1·24 per cent. of children with running ears, one or both, the tuberculous group 3·18 per cent. These differences are beyond the usual limits of variation in such groups as we are dealing with; they probably mean a significant degree of correlation or association between tuberculosis and ear diseases.

Deformities.—Finally, the case of deformities may be cited, not because it has any intrinsic value, but because it very neatly illustrates the kind of disturbance which may be expected in the percentages when there is a plain and obvious connection between tuberculosis and other conditions.

* W. C. Rivers, *loc. cit.*, p. 43.

There has never been noticed any constant difference of incidence of deformities as a whole in boys and girls.

It has been customary to classify deformities as (1) developmental, such as webbed fingers and other congenital deformities, etc., and in this group were included high palates and the cases of fulness of the thyroid which are rather common in children and by no means always, or even frequently, portend goitre. (2) Pathological deformities like knock-knees, ankylosed joints due to disease, etc., and among them were noted all cases of scars of abscesses—including, of course, tuberculous abscesses—which had burst naturally. (3) Traumatic deformities, or all sorts of visible deformities due to accident, such as mutilated fingers, etc., and this group included all marks of surgical operation, and, therefore, operation for tuberculous glands. The percentages are shown in the following table :

DEFORMITIES.

	Developmental. Per cent.	Pathological. Per cent.	Traumatic. Per cent.
Entire group .	11 32	5·5	1·5
Tuberculous group .	11·3	38·8	8·1

CONCLUSIONS.

The following conclusions may, perhaps, be drawn from a comparison of the tuberculous with the average child :

(1) The weight to height ratio gives little or no help in the diagnosis of tuberculosis in children.

(2) A previous attack of any of the common infectious illnesses of children does not, in general, seem to predispose to subsequent attacks of tuberculosis.

(3) There is no evidence that more cases of tuberculosis arise among our badly-environed children in Staffordshire than among our better environed, but this may well mean that our relatively badly-environed country children are, after all, not very badly off.

(4) Our figures give no support to the belief that enlarged tonsils and adenoids as indicated by mouth breathing *materially* favour the development of tuberculosis.

(5) There is no evidence that caries of teeth to any appreciable extent leads to tuberculosis or favours its development.

(6) There is evidence that cervical glands are enlarged in tuberculous children much more frequently than the average, not only in glandular tuberculosis, but also in pulmonary and other kinds.

(7) There is no evidence that tuberculosis favours, or is favoured by, heart affections.

(8) There is evidence that the tuberculous have fewer dull and backward among them than the average group, and, on the other hand, that they yield a larger proportion of mentally deficient cases.

(9) There is evidence that the tuberculous group yields an unduly large proportion of cases of defective sight and eye diseases, but the difference is not marked. A similar and more marked difference is noticed in ear diseases.

(10) As might have been expected, anæmia is very prevalent among the tuberculous, and nutrition is markedly depressed.

Clinical Picture of Pulmonary Tuberculosis as seen in Children actually attending Elementary Schools.

Of 283 cases of tuberculosis of all kinds, in 87 the lungs were the seat of the disease. The cases of pulmonary tuberculosis which we meet with among school children are not the well-defined, typical, and advanced cases familiar to the clinician, for such would naturally be under treatment and debarred from attending school.

Generally speaking, it is the incipient and quiescent cases alone which come under the observation of the school medical inspector. It is among such cases as these that the difficulties in physical diagnosis are greatest, and detailed and prolonged observation is, in many cases, essential to complete certainty.

In the absence of specific tuberculin tests, and, in the main, without the help of bacteriogical examination of the sputum, we can yet, on clinical evidence alone, be reasonably sure of the presence of pulmonary tuberculosis in each of the 87 cases under consideration. Probably, with finer tests and more prolonged observation, some of the marginal cases of lung weakness might also have been included among the genuine cases of pulmonary tuberculosis.

What are the clinical manifestations constituting evidence of the presence of this disease?

In the *normal child* of this age (12–14) we expect to find—

(1) A well-formed and healthily-covered chest, not, as a rule, showing a tracery of veins.

(2) Good respiratory movement and free entrance of air, showing itself to the eye and hand in adequate and even expansion; and to the ear in the gentle, rustling sound of the air entering the vesicles during inspiration, heard neither too close to the ear nor from too great a distance, as we listen over the surface of the chest.

(3) Healthy, air-filled lung-tissue, detected by the clear, resonant note elicited on percussion, and by the absence of any variation

from, or accompaniments of, the normal, vesicular breath-sounds on auscultation.

We must not, however, overlook the fact that certain deviations from this type are quite consistent with normal health :

(1) A harsh type of breathing is quite common in healthy children of this age, and in certain sites—notably the right apex—bronchial breathing is frequently heard when complete examination reveals quite healthy conditions. Of greater importance is the feeble breathing of the imperfectly expanding lung, but this does not necessarily suggest tuberculosis.

(2) It has been shown in the summary of Dr. Moffett's cases in the Annual Report of the Staffordshire School Medical Officer on 1910, p. 77, that dulness may occur in patches over the surface of the chest even in children of sound health. It is only the association of such dulness with other symptoms that lends it significance for the diagnosis of tuberculosis.

(3) Many apparently quite healthy children of a thin type show a tracery of medium-sized blue veins over the chest.

Bearing in mind these features of the normal, the evidences of lung disorder which were noted in the pulmonary tuberculous cases under consideration include—

(1) Those evident to the eye. *Flattening and retraction* of portions of the chest surface ; this occurred most frequently in the infraclavicular regions, sometimes affected the whole of one or both sides of the chest, and was occasionally associated with kyphosis and lordosis. In some clear cases of tuberculosis the *superficial veins* of the chest were dilated, but in many there was no dilatation. In one or two *fibrillary contraction* of the chest muscles was elicited. *Diminished expansion* of part or the whole of one or both lungs was almost constantly observed.

(2) Those detected on placing the hand on the chest. Here, again, *diminished movement,* local or general, headed the list, and increase in *vocal fremitus* occurred in many cases.

(3) Evidences found on percussion. Alterations of the normal resonance of various parts of the lung varying from slight impairment to absolute or wooden *dulness* were found in almost every case, indicating most probably (with the reservation given above) conditions of deficient air-entry, slight congestion, and, in some instances, actual consolidation. Only very rarely was the note tympanitic or in any way suggestive of cavity formation.

(4) Evidences disclosed by auscultation. These were (*a*) Deviations from the normal vesicular type of breathing which occurred

at various sites in the lungs. Under this heading we found the *diminished respiratory murmur* of feeble expansion or congestion; the *cog-wheel* or wavy type of breathing with prolongation of expiration; and the definitely *harsh* and bronchial or tubular, high-pitched breathing of consolidation. Rarely was there heard the amphoric type associated with cavity formation, and in no case were the sounds distant or altered in such a manner as to suggest the presence of fluid. (*b*) Adventitious sounds accompanying the breathing, such as the creaking *rhonchi* of dry pleurisy, the dry and moist *râles* of bronchitis, and the fine *crepitations* more closely associated with tuberculous processes, which were all occasionally noted. (*c*) Alterations of vocal resonance. Slightly *diminished resonance* as from imperfectly expanding lung was noted in a few cases, but the deviation from the normal usually took the form of *bronchophony*, and, in one or two instances, whispering *pectoriloquy*.

It must not be supposed that in every case all or even a great number of the above signs were present. In some there was little beyond poor expansion, slight dulness, cog-wheel breathing, and perhaps a few crepitations in a small patch, but there was always sufficient evidence of localised or fairly general chronic bronchitis or of broncho-pneumonia, and, very occasionally, of bronchiectasis and cavity formation.

Having discovered so much, the next point was to decide whether the condition was of a tuberculous nature or not, and here the subjective symptoms and previous history had perforce to be the mainstay of the diagnosis. Tuberculosis in this respect is very different from heart disease in school children. The latter disease is usually discovered quite unexpectedly. No suspicion has been previously aroused by untoward symptoms. But in pulmonary tuberculosis the possibility of its occurrence has already been presented to the inspector's mind by the history volunteered by mother or teacher. It is comparatively rare for suspicion to be first aroused by the examination of the chest.

Thus the final decision is largely determined by a consideration of the associated conditions and the previous history.

Associated conditions.—Cough was present in the majority of the cases, sometimes the short, hacking, dry, spasmodic cough at night suggesting the possible pressure of an enlarged bronchial gland on the recurrent laryngeal nerve, and whatever the nature of the cough it had usually been of long duration. *Expectoration* was not present to a marked extent, being noted only in 14 cases, and generally very little in amount. *Hæmoptysis*, chiefly as streaks of blood in the

sputum, was noted in 9 cases. *Pain in the chest*, probably due to a small patch of localised pleurisy, was mentioned in only 2 cases. *Anæmia, night sweats, loss of appetite,* and progressive *loss of weight* occurred in most of the cases. The *temperature* variations were not always ascertained, but there were evidences of feverishness in a hot, dry skin, headaches, and in feelings of languor and weariness.

Previous history.—The following illustrative items are taken at random: (1) Had pleurisy a year ago. (2) Is attending tuberculosis dispensary and having tuberculin injections. (3) Has bronchitis every winter. (4) Had pneumonia four times. (5) Has had four attacks of hæmorrhage from the lungs. (6) Had consumption of the bowels in infancy.

As to *family history*, tuberculosis was present in 27 of the 87 cases, or 31 per cent., and in 19 of the 27 cases there was every likelihood of present or previous contact.

Clinical Picture of Glandular Tuberculosis as seen in Children actually attending Elementary Schools.

Out of 283 cases of tuberculosis of all kinds there were 134 glandular cases. The glands of the neck were the seat of disease in all the recorded cases, and in 2 of them the axillary glands were also involved. Affections of the mesenteric glands were included in the abdominal group.

In our previous annual reports attention has repeatedly been called to the fact that the prevalence in children of cervical glands, which can be recognised by palpation, is very great indeed. Slightly enlarged, soft, homogeneous, but quite definable glands occur in many healthy children without any discoverable peripheral cause, and are probably not in any way pathological.

There are also many cases of indolent enlargement of glands distinctly associated with verminous heads, carious teeth, impetiginous eruptions, etc., which subside readily on removal of the cause of irritation. These two classes, however (the non-pathological and the slightly pathological), present no difficulties of diagnosis; but the school doctor is still confronted with a large number of cases of marked chronic enlargement of the cervical glands, regarding which the decision must be made as to their nature and origin. Syphilitic enlargement and Hodgkin's disease are practically non-existent among our school children, and if such should occur they would be immediately recognised by evidences of the disease elsewhere; so that the diagnosis resolves itself into a differentiation between (1) a definite tuberculous process, (2) possible enlargement and suppura-

tion due to organisms other than tuberculous, and (3) the simple glandular hyperplasia so frequently associated with enlargement of the lymphoid tissue of the throat and fauces, which tends to undergo spontaneous atrophy at the time of puberty.

The cases considered in this paper were, generally speaking, of such a nature that there could be no question of their tuberculous origin. They were, however, of very varying degrees of development and severity. In some there was noted merely the simple enlargement of one gland or more to the size of a pea, bean, pigeon's egg or walnut, and such glands were most frequently situated near or below the angle of the jaw on one or both sides. It was rare for the hypertrophy to be so extensive as to form large tumours on both sides of the neck. Such cases may probably have been found among the eighteen cases showing scars of previous operation.

Where several glands were affected in the same child they were not, as a rule, all in the same stage. Some of the affected glands were described as hard and shotty, some showed signs of softening, some were matted together in a lumpy mass or were fixed to the skin, which was stretched and thin, with periadenitic adhesions. In a few cases there were discharging sinuses, with large, irregular, ulcerated edges and a purulent, watery discharge, but discharging cases would usually be away from school and under treatment.

In 43 of the 134 cases abscesses had burst spontaneously, leaving the typical bright red scars, some deeply sunk and some raised into prominent ridges from excessive fibrosis.

In the earlier cases, before the forming of the characteristic "cold abscess" had taken place, diagnosis of the tuberculous origin of the condition was aided by (1) the presence of scrofulous manifestations elsewhere (pulmonary, osseous, or abdominal tuberculosis was present in seven of the cases), (2) the history of the occurrence of tuberculosis in the family (present in five cases), and (3) the general appearance of the child and certain constitutional symptoms—a delicate look, moist hands, poor nutrition, anæmia, and occasional feverishness would suggest the possible presence of a tuberculous process.

Tuberculosis of bones and joints occurs in such a great variety of forms, and affects so many parts of the body among the recorded cases, that a composite clinical picture cannot well be presented. The tuberculous process usually affected a single joint or bone, and in the following frequency: Hip, 16 cases; knee, 7 cases; spine, 6 cases; lower maxilla, 3 cases; ankle, tibia, and humerus, 2 cases each; femur, elbow, wrist, ulna, and fingers, 1 case of each. In a few instances the particular bone or joint was not specified.

The disease was rarely seen in its active stage, but chiefly when quiescent, and the cases showed the results of the previous disease in deformity of varying degrees—atrophy of muscles, marks of old sinuses, and ankylosis or stiffness of joints.

The cases of abdominal and cutaneous tuberculosis are too few to make a description of any value.

EXTERNAL EYE DISEASES OF ELEMENTARY SCHOOL CHILDREN.

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The following paper is based on the medical notes of all the children who had external eye disease on the day of medical inspection in 1914. It refers to the children of 5–6 and children of 12–14, these being the only groups inspected that year.

When a child is up for routine inspection and is found to have some ailment likely to interfere with its well-being or education a "revise" card is opened for it, and at subsequent visits the child is again seen and the progress of its ailment noted. Thus in the case of the older children we generally have more or less adequate medical notes. In the case of children 5–6 there is for the most part only the entry of the first observation.

It is, however, necessary to bear in mind the nature of the field of inquiry, its extent, and its limitations. At the inspections there is an average of about 10 per cent. or 12 per cent. of those on the rolls who are absent from one cause or another, and among the absentees would, of course, be relatively a larger proportion of ailing children than among those attending school. Especially would children with inflamed or infective eyes be absent.

The objects of the research are (1) to determine the incidence of external eye diseases according to the age and sex of the sufferers (vision defects are also referred to, by the way, in this connection); (2) to indicate the particular eye diseases found and their relative numbers; (3) to note how far the incidence of the diseases seemed to be influenced (*a*) by the child's environment, (*b*) by the constitution of the child as shown by the other disorders it was suffering from; (4) to write out a clinical description of the various external eye diseases of children as they present themselves to a school doctor; (5) to investigate the statement pretty generally accepted that defective

vision predisposes to blepharitis; (6) to illustrate the relationship of the common infectious diseases to external eye diseases; also (7) the relationship of skin diseases, and (8) of adenoids and enlarged tonsils, all of which have been supposed to have a connection with external eye diseases.

The total number of children up for their routine inspection in 1914 was:

	Boys.	Girls.
Age 5–6 . . .	4310	4265
„ 12–14 . . .	4840	4898
	9150	9163

(1) *Age and sex.*—The incidence according to age and sex of all external eye diseases taken together is illustrated in the following table:

Year 1914.	Age, 5–6.		Age, 12–14.	
	Boys.	Girls.	Boys.	Girls.
Total inspected . . .	**4310**	**4265**	**4840**	**4898**
No. of external eye diseases	126	155	142	205
Percentage	2·92	3·63	2·92	4·18

Thus there is a larger percentage among girls than among boys, and, as might have been predicted owing to the prolonged risks of life, there is on the whole a larger percentage among the 12–14 group than among the 5–6's, though, as it happens this year, the increase shows itself chiefly among the girls.

In order to judge of the amount of significance to be attributed to these differences according to age and sex a table has been prepared based on the accumulated figures of five previous years, viz. 1908 to 1912, and in it we see the same proportional differences:

Years 1908–12.	Age, 5–6.		Age, 12–14.	
	Boys.	Girls.	Boys.	Girls.
Total inspected . . .	**18,846**	**17,630**	**9484**	**9653**
No. of external eye diseases	742	844	407	496
Percentage	3·93	4·78	4·29	5·13

The larger general percentage of cases in the years 1908–12 is due to the fact that the figures are taken from the Annual Reports and not from the children's medical records. In the Annual Reports diseases and not children are counted; the same child might have blepharitis and some conjunctivitis as well.

It is quite clear, taking all external eye diseases together, that girls invariably show a larger number of cases proportionately than boys. And what is true of these diseases in the mass is true also of the separate diseases blepharitis, conjunctivitis, etc., more girls seem to suffer from them than boys.

This is undoubtedly an interesting and unexpected fact, and incidentally it may be stated that we have almost invariably noted a similar difference year by year in the matter of squints. Still, in squints the difference between boys and girls is very small and not quite constant.

This greater liability of girls to external eye diseases, and to a much smaller extent to squint, is of interest in relation to the well-known fact which has been much discussed by school medical officers of the greater liability of girls to vision defects. It is always found that many more girls fail at the Snellen tests than boys. Our own figures for the children of 12–14 in 1914 (we do not test children of 5–6) are as follows:

	All degrees of vision defect. Year 1914.
Boys	26·78 per cent.
Girls	33·15 „

The percentages for the three years 1909–10–11 were: Boys, 28 per cent.; girls, 32·5 per cent. But the point need not be laboured, it is admitted.

The disability on the part of girls is sometimes explained by supposing that the eyes of girls are subjected to much greater strain from fine sewing, etc., than those of boys. It has never seemed a quite satisfactory explanation, because the time devoted to sewing—an hour three times a week—always appeared somewhat insufficient to cause a permanent and rather rapid deterioration of the physical powers of the eye.

In any case, before attempting an explanation we should see whether the disability of girls affects the major optical disorders or only the trivial minor ones. A major defect causing the child to fail to take Snellen $\frac{6}{18}$ or worse, could not mean other than a serious organic defect of the optical media. A minor defect, leading to vision being, say, $\frac{6}{9}$, might easily be due to a more trivial cause, a temporary

blurring of the conjunctiva, or a slight temporary functional inactivity or failure of the accommodating mechanism.

In 1914, as has just been said, the boys showed 26·78 per cent. of vision defects, the girls 33·15 per cent.; that is to say, girls showed 23·7 per cent. more cases than boys. On closer study it appeared that among the quite trivial cases the girls had only 13·1 per cent. more cases than the boys, while among the grave and no doubt organic optical defects the girls had no fewer than 41 per cent. more cases. But in another group of over 4000 children inspected from the year 1909 suitably tested showed that the girls had 13·9 per cent. more cases than the boys. Here, on closer scrutiny, it is found that among the trivial cases the girls had 21·5 per cent. more cases than the boys, while among the more serious cases they had only 4·5 per cent. more. The sex inequality therefore is probably general at every degree of defect and not confined to the trifling cases.

In fact, it would seem, whatever the cause, that the eye in girls is a more delicate organ, more easily put out of order, than in boys. That the inequality extends to all eye diseases and is not confined to vision alone does not make more easy of acceptance the current explanation of the vision defects as due to the sewing classes, etc.

(2) *List of external eye diseases discovered at inspections.*

External Eye Diseases.

Year 1914.	Age, 5-6.		Age, 12-14.	
	Boys.	Girls.	Boys.	Girls.
No. inspected	4310	4256	4840	4898
1. Blepharitis	87	99	88	141
2. Conjunctivitis:				
Catarrhal (non-infective)	22	24	28	24
Muco-purulent	2	1	1	—
Granular	—	1	—	—
Phlyctenular	8	14	3	14
Gonorrhœal (results of)	—	—	1	—
3. Opacities (cause undiagnosed)	4	10	7	20
4. Interstitial keratitis	—	1	1	—
5. Traumatic:				
Scars or opacities	1	1	2	—
Removal after injury	—	—	1	—
Cataract	1	—	—	—
6. Congenital cataract	—	—	1	1
7. Various:				
"Corneal injection"	—	—	1	—
Phthisis bulbi	—	—	—	1
Ptosis	—	—	2	—
Styes	1	4	6	4
Totals	126	155	142	205

(3) *Influence of environment and constitution.*—There are not perhaps any extremely marked differences of social *environment* among the elementary school children in the administrative area of Staffordshire, still some children are better off than others.

A rough indication of this difference in environment, such as it is, may be sought in the record of the smallness of the house inhabited, in the fact that the mother goes out to work regularly, and in the state of the child as to clothing and personal cleanliness on the day of inspection. Unfortunately with regard to size of house and habits of the mothers as to work we have no exhaustive record, the information comes to us haphazard, so that we can only compare the percentage of recorded cases from a sectional group with the percentage from the whole group. Still, it seems evident that if we selected a sectional group characterised by some condition definitely and essentially associated with smallness of house or absence of mother, the reported cases from that sectional group would tend to exceed the percentage from the whole group.

The records of personal cleanliness and state of clothing are, of course, exhaustive and complete; the observation is made in regard to every child.

The results as to environment will best be shown at a glance in one summary table. The age groups and sex groups were first tested separately as well as the particular groups of diseases which constitute the entire group of external eye complaints; but as the various groups were found to give each other mutual support they are not tabulated separately. Personal uncleanliness is somewhat more noticeable in the eye diseases group, but not markedly so, and, speaking generally, it is clear that differences of environment, as far as they can be inferred from the facts at our disposal, have no very appreciable influence on the incidence of external eye diseases.

Environment and External Eye Diseases.

Year 1914.	Number inspected.	Mother an out-worker.	Home, 3 rooms and under.	Poor clothing.	Personal uncleanliness.
		%	%	%	%
Entire group, boys and girls	**18,313**	3·46	7·04	6·93	27·18
Sectional group of external eye disease cases, boys and girls	**628**	3·18	6·68	5·25	30·41

We may now ask what influence *physical constitution or general state of health* has on the incidence of external eye diseases. The

question of diathesis, so intensely interesting to the medical practitioner, receives small attention in the text-books. We are left to infer diathesis from what has actually happened to the patient.

There are, however, certain ailments and conditions found amongst school children which justify us in assuming in many if not in all cases a peculiarity of constitution which might or might not predispose to external eye ailments.

Such conditions or ailments are anæmia, rickets, tuberculosis, and malnutrition. The latter, there is reason to think, judging from our studies of it in Staffordshire, is only rarely connected with actual lack of food or improper feeding, but rather with deeper seated disorders of assimilation and metabolism.

When we take the sectional group of external eye disease cases and compare it with the entire group of children inspected in 1914 in regard to the incidence of the above-mentioned disorders we find the following facts:

Physical Health and External Eye Diseases.

Year 1914.	Number inspected.	Anæmia.	Rickets.	Tuberculosis.	Malnutrition.
		%	%	%	%
Entire group, boys and girls	18,313	14·98	2·8	1·41	17·43
Sectional group of external eye disease cases, boys and girls	628	11·78	2·7	1·75	26·59

As to *anæmia*, there were actually fewer cases among the external eye disease group than the average, and the difference was constant in all the constituent sub-groups; clearly anæmia does not predispose to external eye diseases. In *rickets* there is the same proportion of cases in the eye disease group as in the average. In *tuberculosis* there is a slight preponderance of cases in the eye disease group, but the numbers are small, and the preponderance is not constant in all the sub-groups. In *malnutrition*, however, there is a marked preponderance among the external eye disease group, and the difference is constant in all the sub-groups whether of age or sex, whether blepharitis, conjunctivitis, etc. Whatever be the complex of causes leading to the appearance of so-called malnutrition, they are certainly causes some or all of which favour the development of external eye diseases.

(4) *Clinical pictures.*—Only those types of disease are described which occurred in numbers sufficient to justify a summary statement.

Blepharitis, as described in the clinical notes of the medical inspectors, seems to fall into two fairly distinct groups, one in which the eyelashes are sparse and the margins of the lid scaly and dry and frequently associated with seborrhœa of neighbouring parts, and the other more striking eczematous type with red and crusted hyperæmic margins and matted eyelashes. In the latter type the child often complains that the lids stick together in the morning, and it is sometimes, though not very frequently, associated with eczema or impetigo of the face. In a few long-standing cases where treatment is neglected the lids become very red, unsightly, almost denuded of lashes, and accompanied by entropion or ectropion. The sequelæ are rarely serious, however. In only two cases out of the total of 415 were the latter conditions of entropion or ectropion noted; the disease is, indeed, one which yields rapidly to treatment.

The medical inspector did not always record an opinion as to which of these two types a case of blepharitis belonged; perhaps it was not always possible to form an opinion, but it may be suspected that in some cases close attention was not given to the point. Twenty of the cases are definitely noted to have been seborrhœic and 14 eczematous. Sometimes improvement of the blepharitis was stated to have followed correction of errors of refraction.

Catarrhal conjunctivitis.—There were 98 cases in all. Under this heading we have included all cases of conjunctivitis which were considered non-infective or practically so—where there was conjunctival injection associated with excessive secretion, aqueous, sometimes mucous but not purulent. The feeling of a gritty substance in the eye, burning sensation, and inability to open the eyes in the morning because the lids stuck together were frequent symptoms, but photophobia was rarely mentioned.

Out of the total of 98 cases there was accompanying blepharitis in 10. The defective vision noted in 18 out of the 52 cases occurring in the 12–14 group—we do not test the 5–6's—was quite possibly largely due to haziness caused by a film of the excessive secretion.

Age and sex seem to have little, if any, influence on the incidence of this form of conjunctivitis; at all ages and in both sexes about one child in 200 up for routine inspection had this complaint.

In this particular group of 98 cases there was a large preponderance of cases of genuine tuberculosis as compared with the incidence of this disease among all the children examined. A group of 98 cases, however, is too small to allow of any definite conclusion being drawn.

Phlyctenular conjunctivitis, also called eczematous kerato-conjunctivitis and strumous keratitis, is not a very common disease among our school children, but owing to the frequency of serious results it is worthy of special consideration. There were 39 cases discovered at inspection in 1914, of whom 11 were boys and 28 girls, although the numbers of girls and boys inspected were about equal. Age seemed to have but little influence on the incidence of the disease in this year's group; there were 0·25 per cent. of cases at 5–6 and 0·17 per cent. at 12–14. The types met with varied considerably from the small phlyctenule occurring on the bulbar conjunctiva surrounded by an area of sub-conjunctival injection, causing comparatively little discomfort, to single or multiple small ulcers on the cornea occasionally connected by a bundle of inflamed vessels with the corneo-scleral junction. These ulcers were generally superficial, but occasionally penetrated deeply, leaving dense opacities, and in one case a staphyloma had resulted. In these more advanced cases there was much associated photophobia, lacrymation, and plepharospasm. Opacities had resulted, causing impairment of vision in many instances.

Phlyctenular disease of the eye had the same kind of association with impairment of general health as was found to be the case with external eye diseases in general. Anæmia was not more frequently found than in the average of children; it so happened there was not a single case of rickets among the 39 cases under consideration, but it was rather different with tuberculosis. An important modern view of phlyctenular eye disease is that it is caused by endogenous toxins of the tubercle bacillus with a superadded infection of the *Staphylococcus aureus*.* In this connection it is interesting to note that out of the 39 phlyctenular cases only two had declared and manifest tuberculosis, and one was suspected to have tuberculosis of the lungs. This number of tuberculous and suspected tuberculous cases is certainly beyond the general average incidence of tuberculosis among the children inspected during 1914 (p. 206). Still, it has to be admitted that 2 or 3 out of 39 leaves a large preponderance of the phlyctenular cases with no apparent connection with tuberculosis. But was there any latent tuberculosis? As some slight hint or evidence of latency it may be mentioned that 14 of the children had enlarged tonsils, or adenoids, or both, and that 2 had palpable cervical glands. All these conditions, however, are very prevalent among children at large.

Considering all the facts it may be said that the tuberculosis

* Pfaundler and Schlossmann, 'Diseases of Children,' vol. vii, 1914, p. 136 *et seq.* Philadelphia and London: Lippincott.

theory receives some support from our figures, but tuberculosis can only be a small factor in the production of the total number of cases. (See paper on "Tuberculosis in Elementary Schools," p. 183).

With regard to the possible ectogenous infection the following facts were noted: (1) Blepharitis was present in 6 of the 39 cases. (2) Muco-purulent conjunctivitis had preceded in another case. (3) Measles had occurred recently in one. (4) Fourteen cases out of the 39 showed signs of personal uncleanliness; this is about 36 per cent., and somewhat in excess of the proportion of unclean children in the eye disease group as a whole. It is, however, not so markedly in excess of the percentage of children generally (p. 205) as to make one believe that personal uncleanliness is an important factor in causing phlyctenular disease, though it may contribute to some extent.

It has been suggested* that phlyctenular conjunctivitis is peculiarly apt to occur in children devitalised by carious bone disease and especially disease of the petrous bone (otorrhœa). It is therefore interesting to note that there are four cases of otorrhœa out of our 39 cases of phlyctenular disease. This makes 10·25 per cent. As the percentage of otorrhœa in the totality of children examined in 1914 was only 1·7 our figures may be said to give countenance to the idea, but we must remember that the basic figure—39 cases—is small for generalising.

If it be accepted that there is a high degree of association or correlation between otorrhœa and phlyctenular disease of the eye, it does not follow that one is the cause of the other. It is just as likely that both proceed from a common tendency.

Opacities of undiagnosed origin.—There were 41 cases, 14 at age 5–6 and 27 at age 12–14, *i. e.* a marked preponderance at the latter age. There were 11 cases among the boys, but as many as 30 cases among the approximately equal number of girls.

Under this head we include all cases of opacity in which the history of the case and the character of the opacity were not sufficiently defined to allow of a clear diagnosis. A small circular opacity situated near the periphery of the cornea in a child obviously of the strumous delicate type would probably be at once placed in the phlyctenular or strumous keratitis group; but there would be many instances where the condition was indefinite enough to lead the inspector to suspend judgment, and of these no doubt many also had their origin in a strumous ulcer. The opacities varied considerably in size, density, situation, and the degree with which they interfered with vision. Of the 27 cases at the age 12–14, who alone

* Pfaundler and Schlossmann, *loc. cit.*, p. 139.

were tested for vision defects, in three only was vision perfect to Snellen's test; in 22 of the cases the defect was $\frac{6}{18}$ or worse in the affected eye.

An analysis of the whole 41 cases gave the following results: (1) Sixteen children showed signs of personal uncleanliness; this is distinctly above the average. (2) Signs of poverty or neglect in disreputable clothing, houses of three rooms or under, or where the mother was an outworker, were found in 7 cases; not essentially different from the average. (3) Anæmia in 8 cases; somewhat above the average. (4) Malnutrition in 14 cases; this is remarkably above the average, as it is in all the other external eye diseases. (5) Tuberculosis in three cases, or 7·31 per cent., and one other case in which its presence was suspected. This is an incidence decidedly in excess of the average percentage of 1·41 (p. 206), but still it leaves most cases of opacity with no taint or suspicion of tuberculosis, unless we permit ourselves great freedom of speculation as to latency. In support of possible latency it may be mentioned that there were enlarged tonsils in 19 out of the 41 cases of opacity, or 46·34 per cent., and mouth breathing, indicative of possible adenoid growth, was present in 10 cases, or 24·39 per cent. Both these percentages are decidedly in excess of the average (p. 213).

The cervical glands were palpable in seven cases, and otorrhœa was noted in one, but in neither of these conditions is the incidence appreciably or significantly more marked than in the entirety of children inspected.

One of the cases of opacity was stated to be the result of chronic granular conjunctivitis, and in one there were anterior synechiæ, pointing to a history of deeply penetrating ulcer.

(5) *Defective vision and blepharitis.*—It is very generally accepted that blepharitis is associated with defects of vision, and our school figures enable us to test this statement. If the degree of association is excessive it is clear that the blepharitis group will show a preponderance of vision cases, and the defective vision group a preponderance of blepharitis cases, as compared with the average.

We do not test the children of 5–6 for vision defects, and the older children are tested by Snellen's and Jaeger's types. The figures are as follows: Out of 9738 unselected children 2921, or 29·96 per cent., had defective vision; whereas out of 229 cases of blepharitis 96, or 41·92 per cent., were defective—a marked excess. On the other hand, out of the 9738 unselected children 229, or 2·35 per cent., had blepharitis; whereas out of the 2921 cases with defective vision 96, or 3·28 per cent., had blepharitis—again a

marked excess. The figures, therefore, may be considered to lend support to the current view. When, however, we come to dissect the records of defective vision and take by themselves all the extremely slight cases—viz. those who can take $\frac{6}{9}$ Snellen—we find the excess occurs among these minor cases almost exclusively. Therefore the excess of vision defect, associated with blepharitis, may, in all probability, be explained as a superficial and unimportant matter—viz. as due to the blurring incident to swollen and, perhaps, discharging lids.

(6) *The relation of the common infectious diseases of children to external eye diseases.*—This has always been a point of great interest to clinicians, and our figures enable us to offer a contribution to the subject.

It has almost been taken for granted that many cases of external eye disease, especially blepharitis and conjunctivitis, have had their starting-point in some—perhaps long previous—attack of measles or scarlet fever, etc. If that were so to any extent, we should expect to find a disproportionate number of histories of measles, scarlet fever, etc., in the external eye diseases group as compared with the average. This, as we shall see, is not the case.

It is the duty of the head teacher to ask parents when the child enters school which of the common infectious diseases the child has previously suffered from, and to enter the facts on the schedule; further, as the child continues at school, the teacher enters any such diseases for which the child may be kept away from school. The information is not in every case available, and thus there is an element of chance in the records; but as no selection is exercised, the haphazardness may be presumed to fall equally on all sub-groups of the children. Thus, records of the occurrence of such diseases can only be taken as a rough indication of their prevalence.

Taking all the 628 cases of external eye diseases together and comparing them with all the 18,313 children examined in 1914, it was found that none of the ordinary infectious diseases occurred more frequently in one or the other group. The percentage in each instance was almost identically the same.

Common Infectious Ailments and External Eye Diseases.

Year 1914.	Number inspected.	Measles.	Whooping cough.	Chicken-pox.	Scarlet fever.	Mumps.	Diph-theria.
		%	%	%	%	%	%
Total group . .	**18,313**	39·52	17·76	9·22	6·75	11·06	2·53
Eye diseases group	**628**	40·6	16·4	9·71	7·0	10·98	1·75

On analysing the different classes of eye diseases separately—especially in regard to blepharitis, catarrhal conjunctivitis, phlyctenular conjunctivitis, and opacities—these showed very little variation from the percentages in the whole group, with the single exception of an apparently accidental rise to 27·4 per cent. of whooping-cough histories among the catarrhal conjunctivitis group.

It would seem, therefore, that previous attacks of the common infectious diseases have little or no influence on the incidence of external eye diseases. The effect of existing measles, whooping-cough, etc., can, of course, form no part in our investigation, as children suffering from such diseases are naturally excluded from school and out of reach of the school inspector.

(7) *Relation of skin diseases to external eye diseases.*—Facts already discussed in regard to the connection of blepharitis with seborrhœa and eczema respectively make it of interest to know what is the general relation of external eye diseases to skin diseases.

We usually now classify skin diseases into ringworm, scabies, impetigo, and "all other." The latter group in practice is found to consist of seborrhœa, eczema, psoriasis, intertrigo, herpes, acne, and very occasionally skin diseases of the ichthyotic type. Among them seborrhœa and eczema very decidedly preponderate. In our study of the incidence of "all other" skin diseases we have never found any consistent variation or material difference in regard to age or sex.

When we consider the total group of 18,313 children of all ages and both sexes examined in 1914, the percentage of "all other" cases is found to be 6·1, while when we bring together all external eye disease cases—628 in number—similarly combined as to age and sex 10·35 per cent. are found to be suffering from the skin diseases so enumerated. There is, therefore, a slight excess in the eye disease group.

But when we come to dissect the various tables we find the excess is almost entirely confined to the blepharitis group, for out of 415 cases of blepharitis 54, or 13·01 per cent., had "other" skin diseases (four out of every five of which were seborrhœa or eczema), while in the remaining 213 cases of external eye disease there were only 11 cases, or 5·16 per cent.; and in no other single group of these eye diseases did the percentage of skin diseases rise over 7·31 per cent. This preponderance in the blepharitis group is what we might expect when we remember that seborrhœa and eczema constitute the bulk of "other" skin diseases, and when we remember also the close association of blepharitis with seborrhœa and eczema.

(8) *Relation of enlarged tonsils and adenoids to external eye disease.*—In Prof. Oskar Eversbusch's article on external eye diseases in Pfaundler and Schlossmann's 'Diseases of Children'* it is stated that adenoids, enlarged tonsils, pharyngitis, in fact, hyperplasias of lymphoid tissues generally, are contributory factors in causing phlyctenular conjunctivitis. We are also reminded that von Hoffmann was the first to point out the connection of eczematous phlyctenular conjunctivitis and obstinate eczema and inflammation of the lid margins with similar tonsillar affections, and affections of the lacrymal ducts. How far is this statement borne out in our experience?

A word on our method of tabulating the throat affections found in school may not be out of place. The routine practice of palpation of the nasopharynx in all cases has not been found practicable. We do not now use the term adenoids in our routine tables, but have adopted the classification of mouth breathers in its place. In the year under investigation the term included all children who habitually sat with mouth open, even though on more exact examination there was found no marked obstruction to breathing.

The relation of mouth breathing as thus defined to adenoids is one of great interest to school doctors. In the absence of regular nasopharyngeal palpation in Staffordshire we have not the data for drawing conclusions, but there is every reason to think that the conclusions of Mr. Macleod Yearsley,† founded on the exhaustive examination of 1246 London children, may be taken to apply to Staffordshire children. For instance, he found that his London children showed 13·9 per cent. of mouth breathers, whereas we found in 1914 14·3 per cent.; he found that 32·5 per cent. of his children had enlarged tonsils, and we found 31·2 per cent. of ours. Therefore, when he says he found that 37·8 per cent. of his children had adenoids, we may reasonably assume that our children had a somewhat similar proportion; and when he says, further, that only one-seventh of his mouth breathers were free from adenoids or tonsils, we may feel assured that our experience would have been similar had we put the matter to the test.

In other words, the mouth breathers in our groups of children may be taken as a rough index of the prevalence of adenoids, though by no means indicating the total numbers of adenoid cases. Having explained this, we may go on to the comparison.

When we examine the entire group of children inspected in 1914 we find that 14·3 per cent. of them were mouth breathers. When

* Vol. vii, 1914, p. 139.

† Macleod Yearsley, British Journal of Children's Diseases, 1910, vii, p. 61.

we examine the external eye disease group, we find 17·6 per cent. This is quite a considerable rise—viz. 23 per cent. or 24 per cent. As regards enlarged tonsils of all degrees we find 31·2 per cent. in the entire group and 36·5 per cent. in the external eye disease group—again a fairly marked increase.

When attention was directed to the constituent members of the external eye disease group, the result was, speaking generally, the same. Thus we may conclude that the increase in the prevalence of adenoid hyperplasia in the eye disease group does represent a significant fact.

On the other hand, the difference is by no means marked enough to suggest a predominant causal relationship. After all is said, the majority of external eye disease cases show no signs of adenoid hyperplasia. What seems likely is that the same type of child, with the same diathesis, may be prone to suffer from both hyperplasia and external eye diseases.

LACERATION AND INFECTION OF JOINTS IN CHILDREN.

By Alex. Mitchell, M.Ch., Capt., R.A.M.C.T., Aberdeen.

Since the outbreak of war in 1914, so insistent has been the call to alleviate human suffering, to preserve the vitality of injured parts and, when possible, to restore to them their full function, that many new methods of treatment have been established.

One of the most practical and efficient seems to be the modern method of dealing with lacerated and infected joints, and its value is increased by the fact that it can be applied to civil as well as to military practice.

If anyone has the courage to review all the cases of infected joints which he has seen treated or, better still, has been himself responsible for the treatment of, and to consider the results impartially, he must admit that the older methods of treatment left a great deal to be desired, and that the new ones give hope of better results.

A fair proportion of cases—mostly those in which the synovial membrane had not been injured—when treated by Murphy's method of immobilisation, extension, and repeated aspiration, combined with

injection of glycerine and formalin, made a good recovery with normal function. When this failed, opening up the joint, irrigation, and the insertion of drainage-tubes into the synovial cavity, if successful in combating the infection, resulted in most cases in a stiffened or an ankylosed joint.

While it is generally admitted that free opening of a joint, followed by the insertion of drainage-tubes, results in more or less complete loss of function, the idea is often advanced that greater liberties can be taken with a child's joint, and that, in spite of fairly drastic treatment, the joint will recover its function. Although there is certainly more hope of recovery in early life, neither is the difference so great nor is it so consistent as to justify the old plan of treating infection, especially when one remembers that the production of a stiff joint in a child is always more of a tragedy than in the case of a patient well advanced in life.

The importance of this subject and its direct bearing on civil practice have made me venture to record three cases of lacerated and infected joints which were admitted to the Aberdeen Royal Hospital for Sick Children since the time when first I had the opportunity of seeing the treatment carried out by Col. H. M. W. Gray in France in 1915.

The technical details are now well known, having been fully described by several writers (*vide* references). The main points are complete immobilisation along with extension, careful excision of all infected tissue, including synovial membrane, in the wound track, removal of foreign bodies when these are present in the joint, and washing out all *débris* and clots with a weak antiseptic or preferably with saline solution, which does not cause any irritation of the synovial membrane. This is followed by immediate closure of the synovial membrane or, when infection of the synovial cavity is evident, by placing of small drainage-tubes down to the openings in the synovial membrane and fixing them so that they do not project into the joint cavity. The rest of the wound is left unsutured and dressed with a salt pack or Bipp dressing, which should not be disturbed until the synovial wound has had time to heal. When tubes are used they should be removed as soon as is possible.

If the joint shows any sign of increased tension it must be aspirated from time to time. Glycerine and formalin or hypertonic saline solution may be injected, but this is probably not an essential part of the treatment.

Immobilisation must be maintained without a single intermission until all fear of lighting up the infection by movement is past.

Cases.

Boy, aged 5½ years, admitted on November the 17th, 1915. History of five days' illness, complaint of pain in right hip and right knee-joints, and of tenderness when the hip was touched or moved.

On admission, temperature 100° F., pulse 120. Right leg abducted and rotated out. Pressure over region of hip-joint or on great trochanter caused pain. Movement at hip-joint impossible on account of pain. There was some swelling evident near the front of the joint.

A skiagram showed an appearance suggestive of an osteomyelitis of the neck of the right femur. The joint was opened through a posterior incision and was found to be full of very thick pus. Careful examination of the head and neck of the femur, especially in the region of the epiphyseal line failed to show any roughening or irregularity of the bone. After irrigation a small rubber drain was placed down to the synovial membrane. The wound was partially sutured and a saline dressing put alongside the tube. The limb was immobilised and extended in an abducted position. The tube was removed in twenty-four hours, and the dressing three days later, by which time the pulse and temperature were normal. The wound healed by granulation, and in two months the limb was fixed in plaster of Paris.

According to the pathologist's report the infection was due to an organism "probably pneumococcus."

Boy, aged 7 years, admitted February the 28th, 1916. History of having been hit, five days previously, on the left knee by a sharp stone. A simple dressing had been applied to the knee, which had become swollen and very painful. On admission, temperature 103° F., pulse 126. Small abrasion on the left of the patella. Joint distended, painful and tender. The "abrasion" was examined under an anæsthetic and found to be a small perforating wound of the knee-joint. The wound track was completely excised and a small opening made into the joint on the other side of the patella. A large quantity of purulent clot was pulled out, and, after irrigation, tubes were placed down to the synovial openings. The joint was immobilised and extended. After operation there was a profuse septic discharge from both tubes. The pulse and temperature remained elevated. Irrigation with weak carbolic solution and with saline solution was done through the tubes twice daily. At the end of a week there was no improvement, and the general condition was getting worse. On the eighth day the irrigation was discontinued

and the pulse and temperature fell to normal within twenty-four hours. After this the discharge became gradually less, and the tubes were removed about the fourteenth day and replaced by salt dressings. In a month after operation the wound was firmly healed and there was very little swelling of the joint. The leg was then fixed in plaster of Paris.

The infection of the joint was due to a streptococcus.

Irrigation of the joint in this case appeared to have done harm, and to have prolonged the activity of the infection.

Boy, aged five years, admitted October the 12th, 1916. A few hours before admission the wheel of a cart had passed over his left foot.

On admission, pulse 98, temperature 98° F. There was a wound running over the dorsum and outside of the left foot, with a compound dislocation of the ankle-joint. Under an anæsthetic the lacerated edges of the wound were excised along with the infected fascia and synovial edges. The tendons on the dorsum of the foot were exposed, but not divided. The peroneus longus tendon was found to be completely divided, and the bony attachment of the posterior part of the external lateral ligament was torn from the os calcis.

A considerable amount of extraneous matter had been forced into the joint. After irrigation and reduction of the dislocation the synovial membrane, the peroneal tendon, and the torn lateral ligament were sutured. After partial suture of the skin wound, a salt pack was placed in the lower part of the wound and the foot fixed on an ankle-splint, so that the dressing could be changed without disturbing the joint. A prophylactic dose of anti-tetanic serum was given. After operation the pulse rose to 120 and temperature to 103° F., but they gradually came down to normal in about four days. There was slight infection of the skin wound which was well healed in about a month, when the patient was discharged from hospital with the foot fixed in plaster.

The after-treatment of all these cases consisted in fixation for about one month after the wounds healed, then massage and passive movement. Had better facilities for massage been at our disposal it would have been started sooner. In all three cases practically complete functional recovery had taken place in from three to six months after the time of operation.

In dealing with such conditions in young children, where the local discomfort is often great and the general condition poor, one's greatest difficulty lies in the management of the immobilisation.

When properly made splints of the types recommended by Sir Robert Jones can be obtained, they should be used, as they ensure real rest, which is not interfered with when the patient is carried out into the open air, where he should be taken as much as possible if he is not in a modern hospital where plenty of open-air beds are provided. This applies particularly to the abduction frame for hip cases and to the Thomas' splint for knees. If these splints cannot be obtained, extension by weight and pulley may be employed along with side- or back-splints and sand-bags, but if treatment is likely to be required over a prolonged period these should be replaced by Jones' splints.

When the wounds have healed plaster of Paris will be found equally convenient, and it can be so applied that massage may be done when required.

When any one form of splint is being replaced by another, great care must be observed not to permit of any movement in the affected joint. The exact time at which massage and passive movement may be begun will depend on the nature and progress of each case, but in no case should any manipulation which appears to cause pain be persisted with. If, after any attempt at movement, the patient complains of pain, and shows any sign of recurring synovitis, the joint should be rested completely for a week or two before any further movement is tried.

In knee cases it is important that massage of the muscles of the thigh should be commenced as soon as posssble after the acute infection has subsided, as by preserving the tone of the thigh muscles the recovery of the function of the joint may be considerably expedited.

References.

(1) Gray, H. M. W.—'Brit. Med. Journ.,' 1915, ii, p. 41.
(2) Hull, A. J.—'Surgery in War,' London, 1916.
(3) Lockwood, A. C.—'Brit. Med. Journ.,' 1916, i, p. 153.

PARTIAL SCLEREMA NEONATORUM, WITH REMARKS ON TREATMENT.

By George Pernet, M.D.,
Dermatologist to the West London Hospital.

During the last six years I find that two cases only of sclerema neonatorum, and those partial ones, have turned up in my skin clinic.

Case 1.—A female infant, aged 2 months (N. 4697), came under

observation on March the 13th, 1917. One day after birth it was noticed that the skin was thickened and lumpy about the deltoid area of both arms. Similar thickenings were then noticed subsequently about the upper part of the back (scapular areas) and the buttocks. There was also thickening of the left cheek. The condition was that of sclerema. The infant was badly nourished.

The mother had had two living children, and a miscarriage (last of these three pregnancies) a year previously—she thought through lifting.

There was nothing suggestive of congenital syphilis about the child, except perhaps the thickening about the cheek. Nor was there anything observable in the way of syphilis about the mother, apart from the miscarriage, which is always a point to take into consideration.

I put the child on pulv. hydrarg. c̄ cretâ gr. j *ter die p.c.*

The Wassermann turned out negative in both mother and child.

On March the 16th I ordered in addition ung. hydrarg., half strength, to be rubbed into the scleromatous areas, and on March the 31st a saline hypodermic of ten ounces was administered owing to the malnutrition of the child.

The sclerema areas in April were "knubbly" instead of being in a solid sheet; they were obviously undergoing involution. Pulv. hydrarg. c̄ cretâ was continued all through.

The infant went on improving, and was then lost sight of until March the 19th, 1918, when the mother brought the child to my clinic at my request. The child had now quite recovered, and looked well nourished and well grown. There was nothing about the skin.

Case 2.—A female infant, aged 3 months (N. 6018), seen on March the 1st, 1918.

The condition of the skin was noticed from birth. There were areas of sclerema about the scapular regions, especially on the right side, and in the deltoid regions of arms. There were also two symmetrical indurations about the cheeks, better felt than seen. As I have already mentioned, faintly yellowish areas of induration are at times observed in congenital syphilis neonatorum, but there was no other evidence of syphilis about the child, except a conspicuous reddened shininess *en nappe* about the buttocks and genito-anal regions.

The mother had had eight pregnancies (two stillbirths).

The infant was breast-fed and looked fairly nourished. There was nothing suggestive of syphilis about the mother, who looked well and strong.

The mother complained bitterly of the restlessness and constant screaming of the baby, which gave her no rest. The sclerema areas were very tender, and made the child cry more when touched.

I ordered pulv. hydrarg. c̄ cretâ gr. j *ter die p.c.*

The subsequent Wassermann report was negative both in the mother and child.

On March the 8th the mother stated that the child had immediately improved on the treatment and was quiet, and that she herself had "lovely" nights now. The sclerema patches were no longer tender to touch and led to no crying.

The areas were somewhat smaller and less hard. The redness about the buttocks had disappeared.

This child was also lost sight of, but, when brought to my clinic at my request on June the 4th, 1918, I found the child had done well. The nutrition had improved, and the sclerema areas had practically disappeared.

I consider the mercury in both cases cleared up the sclerema as the improvement was so immediate. I think, too, that syphilis could be ruled out. The mercury, therefore, must have acted as an alterative—to use an expression which has become more or less obsolete.

At any rate, mercury should be tried in this class of case. Nor would I hesitate to employ mercury in generalised severe sclerema neonatorum, either by the mouth, or, were that out of the question, by means of inunctions, and *à fortiori* if there were any positive evidence of syphilis either in the mother or child.

The distribution of the sclerema was very similar in both cases, the seats of election being the deltoid and scapular regions, the cheeks, and the buttocks.

MULTIPLE PAPILLOMATA OF LARYNX REMOVED BY OPERATION (SUSPENSION METHOD) AFTER TRACHEOTOMY; DEATH FIVE WEEKS LATER FROM ACUTE MEMBRANOUS TRACHEITIS AND BRONCHITIS.*

By Hunter Tod, F.R.C.S.,
Aural Surgeon to the London Hospital.

A boy, aged 4 years, was admitted to the London Hospital on September the 7th, 1917, suffering from attacks of dyspnœa and

* The case was reported to the Section of Laryngology of the Royal Society of Medicine on December the 7th, 1917.

stridor, especially when asleep. Symptoms were stated to have dated from birth, but got worse for the two weeks previous to admission to hospital. The vocal cords could not be seen on examination with the laryngoscope owing to an overhanging epiglottis. The child was not hoarse, but could only speak in a whisper.

On September the 12th the child was given a general anæsthetic, but before complete anæsthesia was obtained marked signs of laryngeal obstruction occurred, rendering it necessary to perform tracheotomy at once, as the child was *in extremis*. After the skin incision was made, the trachea was incised straight away; to do this the thyroid isthmus, which seemed to be very large, was cut through. After the insertion of a tracheotomy tube the breathing soon became normal again. The larynx was examined by the direct suspension method and multiple papillomata were found to fill up the larynx. They grew from the right vocal cord, and just above it. They were completely removed, a clear view of both cords afterwards being obtained.

At first the result of the operation seemed most successful, and after the third day there was free breathing through the mouth when the tracheotomy tube was plugged. The tracheotomy wound was small and healed well.

Three weeks after the operation there was some redness round the wound, and some mucus began to be coughed up from the trachea. This was accompanied by an evening rise of temperature from 100° to 101° F. for two or three days. The red area round the wound slowly increased with induration of the subcutaneous tissues. For the next two weeks the mucous secretion increased in quantity, especially after some attacks of coughing. The attacks became worse, and were associated with extreme dyspnœa; and, finally, in addition to the mucus secreted, there was occasionally a considerable amount of blood.

As it was obvious that the child was getting steadily worse, I decided on October the 17th to make a further examination. To relieve spasm, a small quantity of 1 per cent. cocaine with 1 in 8000 adrenalin solution was made to trickle into the trachea along the tracheotomy tube. A very small quantity of chloroform was administered. On removing the tracheotomy tube the opening was found to be lined with thick, gelatinous-looking membrane about $\frac{1}{8}$ in. thick. On inserting a small bronchoscope this membrane could be seen flapping in the trachea during the act of respiration, and extended down in irregular masses as far as the bifurcation of the

trachea. I removed a considerable quantity of this membrane, which lined the opening and upper part of the trachea.

During the examination the child had an extremely severe spasm of dyspnœa, and death seemed imminent. Oxygen was administered, and a few drops of cocaine and adrenalin solution were again applied. It was obviously useless to do anything further in the way of surgical interference, but I advised that if further attacks of dyspnœa occurred a soft rubber catheter should be passed into the trachea beyond the tracheotomy tube. This certainly relieved one or two of the subsequent attacks of dyspnœa, but eventually the child died on October the 19th in extreme distress.

The clinical picture was very similar to that seen in a patient suffering from an intrathoracic group situated at the bifurcation of the trachea, and causing death by obstruction of the bronchial tubes.

Report of autopsy (Dr. H. M. Turnbull, London Hospital).—"Patches of thin, granular membrane in upper compartment of larynx. Gelatinous, somewhat tough, yellowish-grey membrane (0 3 cm. thick), lining the lower compartment of the larynx, and the walls of the tracheotomy opening in the first, second, and third tracheal rings, and almost completely filling the trachea, the left bronchus, and the bifurcation of the left bronchus into the bronchi to the left and lower lobes. Right bronchus free. Purulent bronchitis and a few areas of collapse in portions of both lungs."

Films of larynx (prepared at time of autopsy).—"The films were stained: (1) With Gram and neutral red, and (2) by Neisser's method. There were numerous Gram-positive streptococci in chains up to twelve cocci. There were a few staphylococcal groups of Gram-positive cocci. There were still fewer Gram-positive bacilli. There were slightly curved rods measuring 3 to 8μ by 1μ; they exhibited none of the morphological characteristics of diphtheria bacilli."

Microscopical sections of growth removed from larynx confirm the diagnosis of papilloma of larynx.

Postscript (May the 7th, 1918).—I have never seen a case like this before, and I do not think that the members of the Laryngological Section appreciated its rarity. The extraordinary point about the case was that the child did so remarkably well for nearly three weeks. I feel pretty certain that it was a streptococcal infection through the tracheal wound which would never have occurred had the child been fortunate enough to be operated on in a private nursing home instead of in the general ward of a big hospital.

Royal Society of Medicine.

SECTION FOR THE STUDY OF DISEASE IN CHILDREN.

Friday, March the 22nd, 1918.

Dr. H. Morley Fletcher, *President, in the Chair.*

A Case of Hæmophilia.—Dr. Eric Pritchard.—A boy, aged 7 years, was admitted to hospital with a large hæmatoma under the palmar fascia. By fixation of the hand on a splint in an elevated position the swelling gradually disappeared, and the boy was able to leave hospital after three weeks' treatment. The mother stated that seven of her brothers had died of bleeding at the age of 1, 5, 7, 9, 11, 14, and 31 years. Her eldest son, aged 10 years, who was still alive, was also a bleeder.

Congenital Morbus cordis.—Dr. J. Porter Parkinson.—A boy, aged 9 years, was admitted to hospital at the end of an attack of acute pneumonia. His mother had died of heart disease, and there was a history of similar trouble in her family. The boy was said to have suffered from heart disease since birth, but had been healthy otherwise; there was no history of acute rheumatism. On admission he had signs of consolidation of the right lower lobe of the lung and a temperature of 103° F., which fell by crisis the following day. The heart's apex beat was in the fifth intercostal space just inside the nipple line. The cardiac dulness was normal to percussion, and, on X-ray examination, a loud, rough, long, systolic murmur was heard all over the precordium—loudest at the aortic base, and conducted well up into the neck on the right side. The murmur was also extremely loud over the back of the chest, especially in the interscapular area. A systolic thrill was occasionally felt in the second right intercostal space. The pulse was 96, regular, and rather small. The other organs were normal. There was no cyanosis or clubbing. The boy was much undersized, and his lack of development was shown by only six carpal bones showing centres of ossification instead of seven, which is usual at that age. Dr. Parkinson thought that the condition was one of patent ductus arteriosus, with deficiency in the interventricular septum.

Congenital Morbus cordis.—Dr. Eric Pritchard showed a male child, aged 7 months, who had been admitted to hospital for cough two months previously. On admission loud rhonchi and *râles* were heard over the whole of the back and front of the chest, but no abnormal heart sounds were noted. Sixteen days later the heart was found to be enlarged to the right, and a loud systolic murmur was heard to the right of the sternum. The murmur gradually changed in character, and became less marked to the right of the sternum and more distinct over the usual mitral area. There had never been any cyanosis. There were no symptoms of tricuspid regurgitation, no pulsation in the veins nor enlargement of the liver. At first Dr. Pritchard had regarded the case as congenital, the murmur being obscured by the loud, adventitious sounds in the lungs, but later changed his opinion, though

he could not reconcile the auscultatory evidence with any more pathological condition of the heart.

In the subsequent discussion Dr. CAUTLEY stated that he regarded Dr. Parkinson's case as one of aortic stenosis with secondary mitral regurgitation. The murmurs in Dr. Pritchard's case can be attributed to tricuspid regurgitation and mitral regurgitation, due to general dilatation of the heart.

Case of Osteogenesis imperfecta.—Mr. P. B. ROTH showed a girl, aged 14 years, who had been apparently a perfectly healthy baby. When 16 months old one femur was fractured, and since then she had had ten fractures of her thigh-bones—seven of the right femur, and three of the left. The last fracture took place when she was 9½ years old. She was wearing a Hoefftcke splint at the time. When she was 7 years old cuneiform osteotomy was performed on both femora by Mr. Carless; the right femur united splendidly, but the left took a very long time. She was first seen by Mr. Roth at the age of 12, since when the limbs had been kept in Thomas's calliper knee-splints, and attempts had been made by bands and knee-caps to straighten out the various deformities. Mr. Roth had recently done a cuneiform osteotomy of the left tibia to rectify the severe bowing forwards of the bone. The operation, which took place on October the 8th, 1917, had been a success as regards alignment, but bony union had been somewhat delayed, and union was not yet absolutely firm.

The upper end of the right tibia showed a marked deformity, causing the knee to be extremely recurved. A skiagram showed that a bend had taken place half an inch below the epiphyseal line with the concavity forwards.

Coagulation of the Blood in Purpura and Hæmophilia.—Dr. W. PALMER LUCAS described the results of clinical experiments carried out at the University of California according to the methods laid down by W. H. Howell, Professor of Physiology at the Johns Hopkins Hospital. There were three factors essential to clotting: (1) Prothrombin; (2) thrombin elements; (3) antithrombin—a substance which held the blood in solution. In cases where the coagulability of the blood was diminished, there was either an increase of antithrombin (as in purpura due to streptococcal infection, and in some cases of jaundice) or a decrease of prothrombin. In Henoch's purpura prothrombin was decreased during an attack; the decrease was very pronounced, and the amount of prothrombin present was always below the normal. In blood transfusion for purpura Dr. Lucas preferred whole blood to serum, as in some serums there was an excess of antithrombin. Good results had been obtained from blood transfusion in purpura, but in the case of hæmophilia he had not been able to raise the prothrombin factor enough to obtain success. He usually depended upon rest and local treatment. Hæmophiliacs usually bled up to a certain point and then stopped. If the blood were examined at once (and it was very difficult to get a sample at this time), the factors were practically in the normal condition. The whole factor in coagulation was the balance between pro- and anti-thrombin.

Agminated Molluscum contagiosum.—Dr. J. L. BUNCH showed a boy, aged 11 years, with thirteen molluscum contagiosum lesions confined to the left axilla. The first had appeared three months previously, and was pink, raised, slightly pedunculated, and about the size of a very small

marble. It had a central depression, and was situated just anterior to the posterior axillary fold. The second largest was situated just anterior to it, and was slightly inflamed, probably due to friction. The other eleven lesions varied in size from a pea to a millet-seed, were pinkish or flesh-coloured, and showed more or less marked central depressions. They were scattered throughout the axilla, but some of them tended to form little groups, the largest of which had four lesions. There were no subjective symptoms. Agminated molluscum contagiosum lesions in the axilla were very rare.

SECTION OF LARYNGOLOGY.

December the 7th, 1917.

Teratoid Growth on Hairy Polypus of the Nasopharynx.—Dr. A. Brown Kelly.—A female infant, aged 6 weeks, was brought to hospital on account of the frequent protrusion from the mouth of a long tongue-like growth, which had to be pushed in again by the mother. The growth was first noticed when the baby was a week old, and had since been getting bigger and more troublesome On examination, the elongated growth was found to hang behind the tongue by a fine pedicle coming from the left side of the nasopharnx; the exact site of origin could not be determined. On being drawn out of the mouth it projected $\frac{3}{4}$ in. beyond the lips. The pedicle was severed as high as possible with a fine snare.

The growth on removal had an elongated clubbed shape. It was slightly over 2 in. in length and $\frac{1}{2}$ in. across at its thickest lower part. It was of fleshy consistence, and was covered with skin furnished with numerous fine hairs. Microscopical examination showed an external layer of stratified squamous epithelium four to five cells deep, with in-dippings of a few hair follicles. The underlying connective-tissue was of a loose rudimentary character with two or three minute glands. The central and larger portion of the polypus was composed of tissue closely resembling fat.

Case of Multiple Papillomata of the Larynx in a Child: Tracheotomy and Removal under Suspension Laryngoscopy.—Dr Dundas Grant.—A boy, aged 4 years, was sent to hospital in June, 1917, on account of the impossibility of removing a tracheotomy tube which had been inserted two months previously on account of difficulty in breathing, such as to threaten his life. On laryngoscopic examination, the larynx was seen to be occupied by several papillomata. Under suspension laryngoscopy a large number of small papillomata, about the size of small split-peas, were removed. His adenoids were subsequently removed. On July the 4th, owing to the high position of the former tracheotomy, which involved the cricoid cartilage, a fresh opening was made, about 1 in. lower down, and the same tube as before was inserted. Suspension laryngoscopy now showed complete absence of papillomata. The voice soon returned; he was able to breathe without the tracheotomy tube, and he was sent home.

Two months later his difficulty in breathing returned, and the tracheotomy tube had to be re-introduced. Dr. Dundas Grant found a papilloma attached to the left vocal cord, though there was a fair amount of breathing space in the larynx. The papilloma was removed by direct laryngoscopy, and the tonsils, which were extremely large and buried, were enucleated.

He could now breathe through the larynx, and his voice was good, but the retention of the tracheotomy tube during the winter months was advisable in the expectation that in the interval the tendency to regeneration of papillomata might disappear, owing to the beneficial effect of tracheotomy, even without removal, in cases of papillomata of the larynx.

Multiple Papillomata of Larynx removed by Operation (Suspension Method) after Tracheotomy; Death five weeks later from Acute Membranous Tracheitis and Bronchitis.—Mr. Hunter Tod (*v.* p. 220).

Case of Foreign Body (Collar Stud) in Left Bronchus of a Child, producing Collapse of Lung of a Year's Duration.—Dr. Dundas Grant.—A boy, aged 9 years, was taken ill suddenly on December the 6th, 1916, with vomiting, pain in the left side of the chest and cough, which soon subsided. He was ill in bed for weeks, and then went away for five weeks. In August, 1917, he was admitted to hospital, when it was found that the right lung extended to the left parasternal line, and that there were physical signs of supplemental breath sounds, with no crepitations; the left side was flat and contracted, the lung collapsed, and the stomach elevated. von Pirquet's test was negative. He complained of pain in the left basal region; there was cough and expectoration; the leucocytes were 9000. X-ray examination on the left side showed general diffuse opacity, obscuring the heart and diaphragm, the latter being made out with difficulty, and appearing to be raised (stomach translucency was higher than normal); the heart was withdrawn to the left; there was no evidence of effusion but of general pleural thickening.

Another skiagram, on October the 1st, showed at the level of the left bronchus a shadow of characteristic shape suggesting the appearance of a collar stud at the spot where an indistinct shadow had been previously noted.

On October the 17th an attempt was made with suspension laryngoscopy to introduce a tube through the larynx, but a large tube would not pass. A high tracheotomy was, therefore, performed, and the trachea down to the bronchi was painted with 20 per cent. cocaine, and a bevelled-ended bronchoscope, 8 mm. in diameter, was then introduced for a distance of $4\frac{1}{2}$ in., when the foreign body was detected, seized with Killian's forceps, and drawn out with a bronchoscope tube. A good deal of mucus escaped. A Durham's tracheotomy tube was introduced, as the attempt at translaryngeal bronchoscopy had caused œdema of the larynx. The tube was removed in two days. The patient rapidly improved, but expansion of the lung would be slow, and he was, therefore, learning suitable breathing exercises.

Endothelioma of the Post-nasal Space.—Dr. W. H. Jewell.—A girl, aged 13 years, first noticed something amiss four months ago on account of speaking through her nose; she had had enlarged glands in the neck for three months, and intermittent earache and headache for two months. The growth was attached to the left lateral and posterior wall of the nasopharynx, bulging the soft palate forward; it was fairly firm, extended as high as the left choana, and bled readily on digital examination. The lymphatic glands of the left side of the neck were enlarged, and extended nearly as low as the clavicle; in places they were firm and discrete.

Shortly after the child had been shown she developed cerebral vomiting, followed by blindness first of the left eye, then of the right, and ending in coma and death two months later.

Abstracts from Current Literature.

Acute Infectious Diseases.

The quantitative relationship of milk-borne infection in the transmission of human communicable diseases (*'Journ. Amer. Med. Assoc.,'* 1916, LXVII, *p.* 1997).—**E. R. Kelley**, after an investigation of 76,596 cases of diphtheria, typhoid, and scarlet fevers, and septic sore throat which occurred in Massachusetts during the five years 1910–14 comes to the conclusion that the transmission of diphtheria by milk is so rare an occurrence as to be negligible. Thus, of 31,866 cases of that disease only 11 were due to milk, and in 49 milk was the probable, though not the proved, source of infection. In scarlet fever the number of cases due to milk is higher, though the percentage is small. Of 31,012 cases 495 were proved to be and 57 were suspected of being milk-borne. In typhoid fever the number was 5 per cent. as contrasted with the 10 to 25 per cent. as given in recent public health literature; of 11,282 cases, milk was the source of infection in 553 and suspected in 135. Of milk-borne diseases septic sore throat is the chief, but its occurrence is relatively rare. When it does occur, it is nearly always in epidemic form and of serious import. The number of such cases was 2436, and of these 1914 were due to milk. T. R. WHIPHAM.

Infectious diseases in relation to child welfare (*'Edin. Med. Journ.,'* 1917, I, *p.* 389).—**Claude B. Ker** points out that in discussing the influence of the infectious diseases upon child welfare the main points to be considered are the mortality for which they are responsible and the sequelæ which follow in their train. Special reference is made to scarlet fever, diphtheria, measles, and whooping-cough, particularly the last two mentioned, which are regarded by the public as trivial. Research as regards these two diseases should be encouraged. Attention is drawn to the fact that in Edinburgh a certain amount of isolation accommodation for measles and whooping-cough has been provided, by which means many lives have been saved and dangerous sequelæ have been prevented. J. ALLAN.

Vaccinotherapy in acute infectious diseases of children (*'La Pediatria,'* 1917, XXV, *pp.* 532–602, and 660).—**P. Ceppellini** reports cases dealing with staphylococcal, streptococcal, pneumococcal, gonococcal, meningococcal, typhoid, and whooping-cough infection. He states that this method while achieving successes either hardly flattering or strikingly brilliant, and failures either relative or absolute, has nevertheless fulfilled the elementary principle of therapeutics, *primum ne noceat*, when skilfully used. The failures are not dependent on age; children tolerated, better than adults, the inoculations because in them the negative phase is neither marked or prolonged and sometimes hardly perceptible, as investigations by the author or the opsonic index have proved. Successes depend on the possibility of stimulating, in the infected organism, the formation of the most specific substances against the infecting germs. If exception is made of the streptococcus, *Bacillus coli*, meningoccocus and bacilli belonging to that group which has its own peculiar production of specific antibodies—hence necessitating an auto-vaccine—for the large majority of organisms (*B. typhosus*, gonococcus, diplococcus, staphylococcus, cholera vibrio, etc.),

the various strains are similar, producing antibodies which generally act on the whole species. Hence in these cases a stock vaccine may be resorted to in the first instance and replaced by an auto-vaccine as soon as it can be prepared, usually in not more than five days. *Staphylococcic infection:* Out of more than sixty cases treated by the author, there were no failures, the beneficial effect was evident and a stock vaccine was as efficacious as an auto-vaccine. *Streptococcic infection:* Only seventeen were treated, the effect was generally good, especially in erysipelas. In cases of enterocolitis with streptococcus obtained from the fæces the effect was *nil*, probably due to a polymicrobic ætiology. *Pneumococcic infection:* In twenty-five cases the result was good, in some wonderful, especially where resolution of the pneumonic foci was delayed. *Typhoid infection:* In two cases, apart from the lowering of temperature, there was a marked sense of comfort produced. Stock vaccine acts equally well as autogenous. *Gonococcic infection:* In ophthalmia the results were negative. In 125 cases of arthritis, however, they were favourable, while in 271 cases of vulvo-vaginitis only seven were unfavourable. *Meningococcic infection:* Only autogenous vaccines were used and the results were indefinite as a whole. *B. coli infection:* The data furnished by the author's cases were indecisive. *Bordet-Gengou infection:* In 385 treated, 213 were favourable, 142 failures, and 30 doubtful.

VINCENT DICKINSON.

Diphtheria in New York State (*'New York State Med. Journ.,'* 1918, XVIII, *p.* 177).—**F. M. Meader,** from a study of diphtheria in New York State, finds that (1) the disease is about as generally prevalent now as it ever has been, but that the deaths have been rapidly reduced on account of the use of diphtheria antitoxin; (2) the disease is more prevalent in cities than in rural areas; (3) the disease is most prevalent among children of school age; (4) the control of diphtheria carriers is one of the most important measures that can be prepared to reduce the general prevalence of this disease; (5) in view of the fact that organisms disappear from the throats of diphtheria patients, for the most part between the tenth and the fifteenth day of the disease, it would simplify to a considerable extent our laboratory work if the first day on which the first culture for termination was taken was on the tenth day of the disease; (6) the use of the Schick test is of value in determining those who should be immunised in the presence of an outbreak and the toxin antitoxin treatment promises a method of treating non-immune children so that active immunity develops against this disease.

J. ALLAN.

On nasal diphtheria (*'Die Therapie d. Gegenwart,'* 1917, XIX, *p.* 250).—**G. A. Waetzoldt.**—Of 1000 cases of diphtheria treated at the Moabit Hospital in Berlin between October, 1915, and March, 1917, one-third showed involvement of the nose. There were twenty-four cases of isolated nasal diphtheria in infants. The duration of the bacilli in the nose varied considerably; only the minority of the cases became free of bacilli under two months. Twelve cases of nasal diphtheria in infants were associated with simultaneous involvement of the throat, which generally consisted in the presence of bacilli only, and was rarely manifested by actual membrane. Waetzoldt recommends that, owing to the frequency of isolated nasal diphtheria in infancy and childhood, a culture of the nose and throat should be taken in the case of every nasal discharge which lasts longer than a week, and should be repeated if the first culture is negative. Unilateral nasal discharge should particularly rouse suspicion.

J. D. ROLLESTON.

Subcutaneous emphysema in diphtheria (*'Arch. de méd. des enf.,'* 1917, xx, *p.* 360).—**Mlle. le Soudier** records a fatal case in a boy, aged 3 years, who was intubated for laryngeal diphtheria. The operation was difficult, and the tube had to be removed the following morning when subcutaneous emphysema of the suprasternal fossa was observed. The emphysema extended during the day to the whole of the lower cervical region, and the next day down to the iliac crest. Death took place the same day. In addition to vesicular and interstitial emphysema, an area of broncho-pneumonia was found at the base of each lung. There was no ulceration of the larynx. Only two other cases of surgical emphysema following intubation are on record, both of which recovered. As is the rule in surgical emphysema, the prognosis depends on the pulmonary lesions.

J. D. Rolleston.

Early signs of post-diphtheritic paralysis (*'Münch. Med. Woch.,'* 1918, lxv, *p.* 669).—**T. Gott.**—A very frequent but unknown sign of diphtheritic paralysis is the facial or Chvostek's phenomenon. If a child suffering from diphtheritic paralysis has the middle of the cheek struck with the percussion hammer, in many cases a rapid twitching occurs, either in the region of the upper lip or in the alæ nasi, eyelids, and root of the nose. This sign is one of the earliest to appear in diphtheritic paralysis. Another early sign is increased activity of the knee-jerk. Chvostek's phenomenon and increased knee-jerk may be present in the beginning of convalescence from diphtheria before there is any suggestion of paralysis. In the majority of cases Chvostek's sign vanishes entirely, and the knee-jerks become normal again without any palatal or ocular paralysis occurring. But children who show the facial phenomenon and increased knee-jerks after diphtheria are much more likely to develop paralysis than those in whom this symptom is absent The practical significance of these observations is that by continual examination of the facial phenomenon and the knee-jerks from the beginning of convalescence it may be possible to detect those predisposed to paralysis. Although the paralysis cannot be entirely prevented, further damage to the nervous system can be checked by keeping the patients at rest in bed.

J. D. Rolleston.

On intestinal phenomena in the serum disease (*'Deutsch. Arch. f. klin. Med.,'* 1918, cxxv, *p.* 51).—**H. Widmer.**—Out of 50 cases of serum disease occurring after intra-gluteal injection of antitoxin for diphtheria 36 cases showed well-marked intestinal phenomena, which are classified as follows: 1. Simple enteritis (26 cases). 2. Membranous enteritis: (*a*) With many eosinophil leucocytes (7 cases). (*b*) Without eosinophils (2 cases). (*c*) Hæmorrhagic enteritis (1 case). The diarrhœa, in most of the cases, lasted from six to twenty days, occurred as a rule before the other symptoms of the serum disease, and subsided with them or outlasetd them by a few days. Widmer concludes that there is a certain connection between anaphylaxis or anaphylactic enteritis in the dog and the serum disease as shown by the eosinophilia in the stools in both conditions.

J. D Rolleston.

A case of serum anti-anaphylaxis (*'Med. Klinik.,'* 1917, xiii, *p.* 1119).—**G. Nachmann.**—A girl, aged 12 years, was admitted to hospital with severe faucial and laryngeal diphtheria. Tracheotomy was performed, and injections of 10,000 units intramuscularly and 6000 units intravenously

were given. Ciliary palsy developed in three weeks' time, and, as the paralysis seemed likely to extend, it was decided to inject some more large doses. To avoid anaphylactic shock, the whole of the intended dose (6000 units) was not given, but only the sixth part (*i. e.* 1 c.c.) intramuscularly. Collapse at once occurred, which disappeared in a few minutes after administration of caffeine and camphor. Four hours later the remaining 5 c.c. were given without any general reaction. Two days later another 6000 units were given without any reaction. Similarly, a third, fourth, and fifth injection of 6000 units provoked no reaction. Recovery took place. It is probable that if the child had received the whole dose at the time of the first injection the reaction would have been much more severe and even fatal. J. D. ROLLESTON.

On the treatment of diphtheria with ordinary horse serum (*'Deutsch. Arch. f. klin. Med.,'* 1918, cxxv, *p.* 284).—**A. Bingel,** in the course of four years, treated 471 cases of diphtheria with antitoxin and 466 with ordinary horse serum without any difference in the results. In some cases, indeed, the results obtained with the ordinary serum were better. Thus, in uncomplicated cases the throat became clean sooner and the bacilli disappeared from the throat more rapidly, so that the duration of treatment was shorter. Further, with ordinary serum treatment the cases of toxæmia, myocarditis, and nephritis were less, and paralysis was less severe. These differences, however, were so small that they might be regarded as a mere coincidence, but they were sufficient to show that no superiority could be attributed to diphtheria antitoxin. Bingel concludes that the success of serum therapy in diphtheria cannot be attributed to the antitoxin content of the serum, and suggests that the large doses used at present and at the beginning of the antitoxin era are responsible for the good results obtained. J. D. ROLLESTON.

The complications of scarlatina (*Dublin Journ. Med. Science,* 1918, I, *p.* 12).—**W. S. Boyd** discusses how the different complications affect the individual patient and the part they play in Fever Hospital Administration. He deals with arthritis or scarlatinal rheumatism, nephritis, otitis media, adenitis, rhinitis, heart complications, alimentary complications, and post-scarlatinal diphtheria. He refers to the question of "return cases," and makes the following suggestions to reduce these cases to their lowest limits: (1) Complicated cases should, as far as possible, be isolated from simple cases as soon as the complications appear, especially those accompanied by discharges affecting the nose, throat, and ears. This isolation is not always possible, as, except in up-to-date hospitals, the want of small isolation wards is badly felt. The greatest precautions should be taken by everyone, lest discharges should be conveyed from one patient to another. (2) If it is the routine to discharge patients at six weeks, or any definite time, then a week before that time the patients due for discharge should undergo a thorough examination in bed from head to foot by the medical officer, special attention being paid to the nasal septum and similar places, where a small scab may remain unnoticed till looked for. If any possible source of infection is found, special care for a week may make it safe, and at the examination on discharging day it will not then be found necessary to detain the patient longer. (This is not to be taken that the examination of the patient is unnecessary at other times, but in a busy fever hospital it is impossible to examine minutely all the patients each day.) (3) The provision of a con-

valescent ward apart from the hospital buildings, where the patients can be sent for a week prior to discharge. While here they should be allowed out in the open, and any trace of discharges looked for; if such appear, they should be isolated till they recover, but not sent back to hospital. (4) The usual hot, disinfecting bath should be given at the time when the patient leaves the ward for the convalescent department. If such a department is not available, then the bath should be given some hours previous to the patient going home, and a room should be provided to spend this time in to prevent waiting near the wards or in draughty halls. A hot bath immediately before going out is very likely to cause a cold with all its results. (5) Instructions to parents as to the care of the child, and especially to be on the watch for running of the ear or nose. Medical advice should be sought immediately if such occurs, and in the case of the ear a plug of cotton-wool should be inserted until advice is obtained. J. ALLAN.

The cultivation of a micrococcus from blood in measles (*'Journ. Amer. Med. Assoc.,'* 1917, LXVIII, *p.* 1028).—**Ruth Tunnicliff,** after an investigation of fifty cases of measles, has found a diplococcus in the blood during the pre-eruptive and eruptive stages of the disease. It is present alone and in large numbers before the appearance of the eruption and alone also in a large proportion of cases at the height of the infection. It was also found at the same time in the throat, nose, and eyes.

T. R. WHIPHAM.

Morbidity and mortality of pertussis and measles, with particular reference to age (*'Arch. of Ped.,'* 1917, XXXIV, *p.* 321).—**B. S. Veeder.**—The yearly death-rate from pertussis and measles for the decennium 1904–1913 for the United States Registration Area was, on the average, between 9000 and 10,000. While the death-rate as a whole, and for certain diseases as tuberculosis, diphtheria, diarrhœa, and enteritis under two years, and typhoid fever shows a decrease in the past fifteen years, that for measles and pertussis has remained practically the same. Nearly 80 per cent. of the pertussis and half the measles deaths occur in infants. The older the child the lower the case fatality rate. J. D. ROLLESTON.

Observations on measles (*'Arch. of Ped.,'* 1918, XXXIV, *p.* 38).—**C. Herrman** states that infants under 2 months of age are absolutely immune. The immunity is not conveyed through the breast-milk, as artificially fed infants are also immune, but probably through the placental circulation. The immunity gradually becomes less absolute, so that at 8 months it is apparently entirely lost. When infants between 3 and 5 months of age are exposed to infection and do not contract the disease, they are frequently not infected when exposed to measles later in life. The contact must be intimate and the accidental inoculation must have taken place after the third month, because before that time immunity being absolute, there is no reaction and no immunity is conferred.

J. D. ROLLESTON

Swelling of the plica semilunaris as a prodromal symptom of measles (*'Berl. klin. Woch.,'* 1918, LV, *p.* 402).—**E. Meyer.**—In the prodromal stage of measles, in contrast with other infectious diseases associated with conjunctivitis, the cresentic or sickle-shaped fold of skin known as the plica semilunaris which connects the two lids at the internal canthus,

shows a maximum of inflammatory injection and swelling, and small white specks resembling Koplik's spots, while the adjacent caruncle shows relatively slight involvement. This swelling of the plica possesses diagnostic value, as it appears, as a rule, before Koplik's spots. It subsides, as a rule, on appearance of the measles eruption. J. D. Rolleston.

Thrombophlebitis of the inferior vena cava complicating varicella (*'New York Med. Journ.,'* 1918, cvii, *p.* 355) —**S. A. Blauner.**—A boy, aged 11 years, seventeen days after a mild attack of varicella complained of severe pain in the left hip, radiating down the left thigh, and the following day had excruciating pain in the left lower abdomen just above the inner half of Poupart's ligament, the skin of which became pale and glazed. In the afternoon of the same day similar pain occurred on the right side of the abdomen, followed in the evening by pain and swelling of the whole of the right lower extremity, and next morning by similar involvement of the entire left lower limb. When seen by Blauner in the evening of the third day, both legs, especially the left, and the feet were swollen. Both saphenæ stood out prominently, the abdomen was rigid and tender on pressure. The superficial veins of the abdomen were prominent and remained so nearly five months after the boy's discharge from hospital. From the abdomen the visible veins ascended to both sides of the chest, terminating a little above the nipples. Examination of the urine was negative. The liver was $2\frac{1}{2}$ in. below the costal border, the spleen was not palpable. The temperature ranged from 100° to 104° F. There was no history of trauma nor of typhoid, measles, or pertussis in early childhood. J. D. Rolleston.

Prophylactic vaccination against chicken-pox (*'Arch. of Ped.,'* 1917, xxxiv, *p.* 702).—**M. Michael** was induced by Rabinoff's results (*v.* British Journal of Children's Diseases, 1917, xiv, p. 71) to repeat the same experiment in a large institution in Chicago: 32 children exposed to chicken-pox received prophylactic vaccination; 7 developed the disease—6 between thirteen and sixteen days after vaccination, and in 1 the date was not known; 8 developed lesions at the vaccination site between the tenth and fourteenth day, and 4 of them developed chicken-pox. The inoculation seemed to take place more readily in young children, for the positive results were invariable in children under 5 years of age. The incubation period of thirteen to sixteen days in cases with a general eruption was shorter than the usual period, which is from sixteen to twenty-one days.

J. D. Rolleston.

The effect of vaccinia on the well-being of children (*'Lancet,'* 1917, i, *p.* 993.— **J. P. Kinloch** carefully analysed 3804 cases of infectious diseases, of which 3058 were vaccinated and 746 unvaccinated, and finds that there is shown repeatedly an increase in the incidence of disease complications and death among the unvaccinated. The figures submitted afford no evidence that vaccinia has a prejudicial effect on the child's future well-being as judged by its response to subsequent infection. J. Allan.

Injection of lymph as a protection against smallpox (*'Indian Med. Gaz.,'* 1918, liii, *p.* 140).—**C. F. Fearnside** and **S. G. Poi** think that one of the chief causes of the unsatisfactory vaccination results in the Coimbra district is the mothers' dislike to have their children vaccinated and their practice of wiping away the lymph immediately after scarification.

To remedy this they inject the lymph hypodermically, squeezing it from a leaden vaccine tube through an ordinary hypodermic needle which has been soldered to the cap of the tube. Four insertions are made The usual focal reaction follows, but no superficial vesiculation except when the needle has scratched the surface of the skin. To prove that the method was successful the writers vaccinated twelve persons by the ordinary method who had been injected, and the result was negative in all.

J. D. Rolleston.

Typhoid fever in children (*'New York State Journ. Med.,'* 1917, xvii, *p.* 110).—**J. C. Sincerbeaux** emphasises the importance of milk supply and refers to points of difference in this disease in adults and children. In order to lessen the chances of cases and carriers of typhoid fever and to control them once they are known, the following are among the means that may be employed: (1) Cleanliness in milk production; (2) vaccination of dairy employees against typhoid fever; (3) official supervision of dairies during the presence of illness; (4) isolation of infected persons; (5) official supervision of the pasteurisation of all milk. J. Allan.

A case of oto-typhoid (*'Munch. Med. Woch.,'* 1918, lxv., *p.* 186).—**O. Fleischmann.**—A boy, aged 11 years, fell ill with catarrhal sore throat, and fever. Right otitis media developed at the same time, spontaneous perforation of the tympanic membrane ensued, and a mastoid abscess occurred. Antrotomy was performed, and rapid recovery took place. Examination of the pus from the mastoid abscess showed typhoid bacilli and a much smaller growth of streptococcus brevis. No other signs of typhoid fever were present. The stools were normal, and contained no typhoid bacilli. Widal reaction, however, was positive in 1 : 160 No previous case has been recorded of exclusive localisation of typhoid infection in the ear.

J. D. Rolleston.

Cancrum oris following paratyphoid B infection (*'Riforma Medica,'* 1918, xxxiv, *p.* 248).—**E. Romanelli** records a case of cancrum oris in a boy, aged 12 years, which developed at the end of the first week of paratyphoid B fever. Bacteriological examination showed a large number of spirochætes, micrococci, and fusiform bacilli. Death took place in spite of intravenous injections and local applications of arseno-benzol. Nothing of special interest was found at the necropsy. J. D. Rolleston.

Typhus fever in children (*'Deutsch. Med. Woch.,'* 1918, xliv, *p.* 156).—**E. Martini** saw a large number of children, aged from infancy to 15 years, in a fever hospital in Russian Poland. In children the disease runs a much milder course than in adult life. The fever lasted a shorter time, and no complications or deaths occurred. The mild character of the disease constitutes a great danger for the community, as its nature is readily overlooked, and sick children are allowed to associate with healthy persons. The immunity confined by an attack of typhus is of much shorter duration than that following measles (*cf.* British Journal of Children's Diseases, 1913, x, *p.* 373. J. D. Rolleston.

Cerebro-spinal meningitis (*'La Pediatria,'* 1917, xxv, *p.* 257).—**F. Randone** analyses twenty-two cases occurring during the epidemic at Syracuse. There were several cases with repeated relapses ending in complete recovery. The onset for the most part was typical, in two cases

Kernig's sign was absent, and in one of them no other manifestation but a slight convulsion. Herpes of the face was present in about 50 per cent. The meningococcus was present in the cerebro-spinal fluid in every case, in the nasopharynx in two cases only, and invariably absent in suspected carriers. The mortality was 36·75 per cent. The treatment adopted was intraspinal serotherapy, and there were no phenomena of anaphylaxis.

VINCENT DICKINSON.

Cerebro-spinal spotted fever ('*Dublin Journ. Med. Science*,' 1917, II, *p.* 27).—**D. Hennessy** reports the case in an infant, aged 10 months. When first seen, the infant looked very ill, the temperature was 102° F., pulse 110; it had an attack of diarrhœa, going on for two or three days previously; there were no nervous symptoms, either motor or sensory. There was nothing to suggest what the illness might be, except purpuric spots—patches irregular in shape, largest on the buttocks, but distributed all over the body; a few on the face and scalp, skin not raised, and no paling on pressure. Next day slight opisthotonos noted and Kernig's sign present; lumbar puncture performed and half-ounce turbulent fluid drawn off; throat swabbed. Numerous meningococci were found in spinal fluid; swab negative. The infant had four injections of serum—one intraspinal and three hypodermically—but died on the eighth day after first coming under observation. There were no convulsions at any time. J. ALLAN.

Notes on the outbreak of cerebro-spinal fever at Reading 1915 to 1916 ('*Practitioner*,' 1917, XCVIII, *p.* 436).—**R. Donaldson.**—Of 60 cases, 16 or 26·6 per cent. occurred under the age of ten years, and 15 or 25 per cent. between eleven and twenty years of age. Fourteen cases under twenty years of age died. The greatest number of cases occurred in the month of April. The incubation period varied between three and twelve days; the average duration of illness in fatal cases was 12·2 days. Kernig's sign was present in 95 per cent. of cases. Early and repeated lumbar puncture is of more importance than any other method of treatment. Direct irrigation by flavin of the spinal meninges is suggested. F. R. B. ATKINSON.

Morphological and biological changes in the meningococcus isolated in the epidemic of cerebro-spinal fever in Palermo ('*La Pediatria*,' 1916, XXIV, *p.* 650).—**G. Rutelli** found that on staining by Gram's method strains isolated from forty cases gave negative results except in two instances, but whether these were contamination germs was not possible to decide. With regard to the fermentation of sugars the result was negative with glucose, lactose, and levulose, but there was slight fermentation with maltose. With regard to sera agglutination the author used four kinds, and in all the meningococci were agglutinated and precipitated. With a specific amboceptor using as antigen emulsions of inactivated meningococci there was slight preponderance in favour of serum produced from local strains over others. Their different behaviour suggests the advisability of using a curative serum prepared from strains isolated from cases occurring in the same epidemic. VINCENT DICKINSON.

Serum reactions in cerebro-spinal meningitis ('*La Pediatria*,' 1916, XXIV, *p.* 728).—**B. Romano** found that with regard to the Bordet-Gengou reaction, using the patient's blood serum on cerebro-spinal fluid, suspected of containing specific amboceptor, the results were variable, but

generally the reaction was more frequently present in patients who had been ill at least six days. Both fluid and serum contained specific amboceptors, so that the reaction, when positive, had a diagnostic value. With regard to precipitins and agglutinins in the serum, he found the former frequently absent while the latter were always present in a more or less marked degree. For diagnostic purposes the reaction is of little importance for two reasons: (1) Because it appears late, and, therefore, does not aid diagnosis in doubtful cases; and (2) because agglutination requires strains of meningococcus which are easily agglutinable, and these are difficult to obtain. The reaction of Vincent and Bellot is of equal importance to that of deviation of the complement, but appears earlier and may be positive even on the first day of the disease. Cases cured by serum therapy did not present any difference in the reactions from those still in progress. This may signify that the process of cure takes place by means of mechanisms which are little known, and most probably by means of a more active phagocytosis. VINCENT DICKINSON.

The prophylaxis and treatment of cerebro-spinal meningitis (*'La Pediatria,'* 1917, xxv, *p.* 65).—**E. Carapelle** found that in the epidemic in Palermo, during the first period of the disease when the cases were treated with the serum supplied by the municipality, the mortality was 52·1 per cent.; during the second period, when, in the absence of serum, lumbar puncture was the only therapeutic measure obtainable, the mortality was 52 per cent., during the third period with the employment of serum from abroad it was 33 per cent., and during the fourth period with serum made in Palermo it was 16 per cent. With regard to prophylactic measures, a systematic search for carriers gave uniformly negative results, and disinfection was limited to personal clothing, beds, and floors with 5–10 per cent. solution of lysoform and 1–2 per cent. sublimate.

VINCENT DICKINSON.

Bacteriological researches in whooping-cough (*'Riv. di Clin. Pediat.,'* 1916, xiv, *p* 467).—**R. Porcelli** has made a series of observations relative to the presence and serology of the Bordet-Gengou bacillus and the bacillus Z of Manicatide in whooping-cough. The results authorise him to assert that the serum of animals immunised with Bordet-Gengou bacillus does not contain partial agglutinins for bacillus Z, and *vice versâ* the serum of animals injected with bacillus Z does not agglutinate the Bordet-Gengou bacillus. Bacterioscopic examination of the secretion in whooping-cough shows the constant presence of short, ovoid, vacuolated bacilli, which, however are present in the sputum of those not suffering from the disease. In cases of whooping-cough the author isolated the Bordet-Gengou bacillus by cultures, and only in a single instance was it associated with a micro-organism having characteristics identical with the bacillus Z of Manicatide. He found that the best culture medium was agar, potato, rabbit's blood, which ought to have a neutral or slightly alkaline reaction. With such a culture medium, in twenty-four to thirty-six hours after inoculation with the sputum, characteristic colonies of the bacillus of Bordet-Gengou appear, and this affords a very valuable method of diagnosis. His further researches showed that the blood serum of patients suffering from pertussis agglutinated the Bordet-Gengou bacillus while it did not agglutinate the bacillus Z. The reaction of complement fixation gave similar results.

VINCENT DICKINSON.

Vaccine in the prevention of whooping-cough (*'Amer. Journ. Dis. Child.,'* 1918, xv, *p.* 271).—**F. V. Bogert** inoculated 31 children who had been exposed to whooping-cough with 50,000,000 stock pertussis vaccine. Only one of them had previously had the disease. No reactions were noted, and not a single case developed the disease. J. D. Rolleston.

Mumps meningitis (*'Journ. Amer. Med. Assoc.,'* 1918, lxx, *p.* 1448).—**J. Kaunitz.**—During some epidemics of mumps there seem to be more meningeal complications than in others. As most patients recover after a few days' illness, the meningeal condition is very probably lost sight of, particularly in the milder cases. The condition is due to a sero-fibrinous meningitis, in some cases invading the brain tissue and nerves at the base of the brain. The symptoms and signs resemble those of tuberculous meningitis. The course, however, is very different. Most patients recover, though, in some cases, temporary neuritis has occurred. Atrophy of the auditory and optic nerves and hemiplegia may take place. The gravest forms are those in which the substance of the medulla or the vagus nerves are affected. Kaunitz records three cases in children, aged 4, 5, and 9 years respectively. Two of them were relatively mild, and might have been mistaken for gastro-intestinal attacks; in the other case there was no doubt of the diagnosis from the start, and the patient's life was probably saved by lumbar puncture, which was not indicated in the other two cases.

J. D. Rolleston.

Some aspects of malaria in children (*'Interstate Med. Journ.,'* 1917, xxiv, *p.* 545).—**W. H. Deaderick** states that children are more frequently and more severely affected with malaria than adults. They are prone to pernicious attacks, especially of the cerebral type. At least 50 per cent. of the cases of pernicious malaria in ordinary practice occur in children under ten years of age. The convulsive type is relatively frequent in children living in highly malarial countries, and is more apt to attack children with nervous predisposition, either hereditary or acquired. This form is relatively rare in adults. The type of fever is most often quotidian, sometimes tertian or double-quotidian, rarely quartan. The paroxysm occurs more often during the night than is the case with adults, the fever being often detected for the first time in the morning. The first stage is rarely typical, the rigor being replaced by coldness of the extremities, pallor, slight cyanosis, especially of the lips and nails, vomiting, drowsiness, and sometimes convulsions. During the second stage the fever is often higher than in adults. Gastro-intestinal symptoms, particularly vomiting and diarrhœa, are common. Thirst is intense. The most common complaints are pain in the head and epigastric region. Enlargement of the spleen is more constant than in adults. Torticollis and erythema may be noted. Atypical forms and dangerous symptoms, especially on the part of the nervous and gastro-intestinal systems are frequent. Œdema, ascites, and purpura are not uncommon. T. R. Whipham.

An unusual case of cerebral malaria (*'Journ. Amer. Med. Assoc.,'* 1917, lxviii, *p.* 106).—**O. T. Brosius** reports the case of a girl, aged 11 years, who two days previously was taken ill with malaise, headache, and chills with continued high fever. The following day she had two convulsions and right hemiplegia developed. A blood examination showed the presence of crescents and many ring forms chiefly of the æstivo-autumnal

parasite, though a few showed tertian characteristics. Quinine was administered, and on the fourth day, the temperature fell to normal, and the paralysis disappeared, though the affected limbs were weak. The patient eventually made a perfect recovery. T. R. Whipham.

On the presence of leucotoxins in the blood of patients suffering from leishmaniosis interna (*'La Pediatria,'* 1917, xxv, *p.* 80).—**S. Maggiore** found that a leucolysin having special physical properties was present in the blood in this disease. This leucolysin does not act in the same way as the hæmolysin obtained artificially by the repeated inoculation of washed red corpuscles of animals of a different species, but acts without the mediation of complement since the blood serum containing the inactivated leucotoxin with the addition of complement does not give rise to the phenomenon. The presence of this leucolysin renders more intelligible the pathology of the leucopenia which is not infrequently observed at the beginning of the illness. Vincent Dickinson.

A case of hydrophobia: Attempted specific medication (*'Med. Record,'* 1917, xcii, *p.* 768).—**O. Berghausen.**—A boy, aged 5 years, was admitted to hospital on June 28th for spasms of the throat on attempted drinking of water, which had developed on the previous day. Both he and the uncle had been bitten by the same rabid dog six weeks previously. The wounds were cauterised five minutes after the bite. Pasteur inoculations were instituted within forty-eight hours. The uncle received twenty-one inoculations and the child twenty-four. On June 29th the child became delirious and had several convulsions; 18 c.c. of blood serum from the uncle, who had shown no symptoms, was injected into the child's spinal canal. Death took place the following day. No autopsy. J. D. Rolleston.

Fatal hæmorrhagic dengue (*'Med. Journ. Austral,'* 1917, i, *p.* 7).—**—J. A. Goldsmid** reports two cases in children aged 3 and 5 years respectively. The boy of three died, and the girl recovered.

F. R. B. Atkinson.

Reviews.

Dream Psychology. By Maurice Nicoll, B.A., M.B., B.C.Cantab., Capt. (Temp.), R.A.M.C. Oxford Medical Publications. London: Henry Frowde and Hodder & Stoughton. Pp. 194. Price 6s.

The writings of Freud and of the Viennese psychologists generally have long been available to English readers, but in this country the great differences between the teachings of the schools of Vienna and Zurich have not been sufficiently recognised. In the exposition of the doctrines of Jung now before us, workers in every branch of sociology, psychology, medicine, and religion, will find much of interest; to those working at the fascinating problems raised by the neuroses of war especially we commend it. Dr. Nicoll is one of the very few Englishmen who have had the advantage of working abroad both under Freud and under Jung. To both these masters the dream has a great psychological value. Jung believes that each individual in his development evolves mentally in a manner largely determined by the evolution of his race. Just as our bodies reveal in their structure evidence of the manner in which we evolved,

so our "mental make-up" shows evidence of the previous stages through which the human mind has evolved. To Jung the conception of a "collective psyche," as he terms it, is a fundamental one. At any moment each one of us is the product of the happenings of his forbears and of the reactions which he himself individually, since he came into being, has made to his environment. A study of both these aspects of a person is necessary in all attempts at evaluating the various factors in his present-day adaptations, or lack of adaptations, to his environment. In general, it may be stated that when we are actively employed in doing things, the historical events of the past remain below our conscious surface, but during states of relative inactivity, from our mental background, our unconscious, evidence of the impress and fixation of eretime happenings can be gleaned. One of the most important methods by which this evidence can be obtained is through the dreams of the individual. According to our author dreams usually are symbolical representations of events and incidents, or cartoons. Before any symbol or cartoon can appeal to us, both the symbol itself and the events which are symbolised must be known. By the Freudian school of thinkers these symbolic representations are regarded as evidence of past activities as applied to present-day problems, but to Jung and Nicoll "coming events cast their shadows before," and as a consequence dreams have also a bearing upon the progressive evolution of the individual. The conception of regression or "drawing back of a person into himself before he launches on to new adaptations" is here also, for the first time adequately expressed in English; this conception strikes back to the root of some of the great principles which underlie the development of those manifestations which we all know as symptoms in cases of functional nervous disorders. Both the hysterical and the psychasthenic types shrink away from reality; the hysteric does this to a large extent on the side of his soma, whilst the viscera of the psycho-neurasthenic tend to loom too largely upon his consciousness.

The book is divided into nineteen chapters dealing with the psyche, the problem of the neurotic, mental background, dreams and cartoons, interpretation, compensation, over-compensation, under-compensation, fantasy, and rumour, the unconscious motive and interest, the control of interest, the growth of interest, complexes, extroversion, introversion, balance, regression, the nature of the unconscious, and responsibility. It was written whilst the author was on active service in Mesopotamia, and yet bears but little evidence of the difficulties under which he wrote. A list of authors from whom the writer has drawn most heavily, and an index, complete the book. Dr. Nicoll writes with great lucidity and with an easy style, his descriptions are forcible and withal extremely clear. To workers in every branch of life we commend a study of his book. E. G. F.

Poliomyelitis in all its Aspects. By John Ruhräh, M.D., and Erwin E. Mayer, M.D. Illustrated with 118 engravings and 2 plates. Lea & Febiger. Philadelphia and New York, 1917. Price $3.25.

The writers are to be warmly congratulated on the appearance of this volume, which, as the title denotes, forms an exhaustive monograph on poliomyelitis. It should prove a most valuable work of reference to all interested in the subject.

In the opening chapter, which is devoted to the history of the disease, three periods are distinguished: The first, or period of the study of the

clinical features, embraces the time from Underwood, who first described the disease in 1784 under the name of "debility of the lower extremities," to Heine's second publication in 1860; the second period, during which the pathological anatomy was chiefly studied, commences in 1863, when von Reinecker and von Recklinghausen described an atrophy and degeneration of the ganglion cells and nerve-fibres of the anterior horns, and closes with the publication of Medin's paper in 1898, when the third period or modern era begins.

A full account is given of the pathology of the disease, illustrated by microphotographs of the changes in the cells and vessels of the anterior horns. In the chapter on the nature of the virus the writers state that it is not always possible to demonstrate the organism, and suggest that there are two factors present in the culture—one invisible, and the other the globular bodies described by Noguchi as the causal organisms. In the chapter on epidemiology the writers trace the growth of the conception of poliomyelitis as an epidemic disease and describe its geographical distribution and frequency. Several charts are inserted to illustrate the New York epidemic of 1916, which was the most extensive epidemic of poliomyelits on record. From June to December there were 13,000 cases with 3300 deaths, a mortality of 25 per cent., which is higher than the rate observed in any of the previous large epidemics.

The authors discuss the classifications given by previous writers and adopt the following ones: (1) Non-paralytic or abortive cases; (2) ataxic cases or those with nystagmus, in which there are changes in Clarke's columns, the cerebellum, or intervertebral ganglia; (3) cortical cases; (4) spinal or subcortical cases, which are subdivided into meningitic, bulbar, bulbo-spinal, polyneuritic, and ascending forms. Numerous striking photographs are inserted to illustrate the various forms of paralysis and deformities.

Three chapters are devoted to the therapeutical aspects of the disease, the first dealing with the medical treatment during the acute, convalescent, and chronic stages respectively, the second with orthopædic appliances, and the third with operative procedures. The writers express a doubt as to the efficacy, or even advisability, of the use of horse serum, or normal human serum, and believe that electricity does nothing that skilful massage will not do. The chapter on orthopædic treatment contains a useful list of the special measurements required and ordinary apparatus for the different deformities. As regards operative treatment, the writers maintain that no operation of any kind should be undertaken until at least two years have elapsed from the onset of the disease and until the patient is at least five years old.

The examination of muscles and muscle training are discussed in an important chapter, in which the action of the various groups of muscles and their nerve supply are described, together with the appropriate tests and exercises. The chapter entitled "Some Anatomical and Physiological Reminders" supplies indispensable data for the intelligent study of the disease.

The concluding chapter contains lists of the epidemics of poliomyelitis in Europe, America, and Australia prior to 1911, and of those occurring in the United States from 1911 to 1916 inclusive.

The book is well printed and illustrated. Such errors as *tâche cérébrale* (pp. 88, 130), "genu valgus" (p. 191), and "tendo-Achilles" (pp. 196, 199, etc.) will doubtless be corrected in the next edition

J. D. R.

STAFFORDSHIRE COUNTY COUNCIL EDUCATION COMMITTEE: ANNUAL REPORT OF THE SCHOOL MEDICAL OFFICER FOR THE YEAR 1916. Stafford: J. & C. Mort, Ltd.

THE county of Staffordshire possesses 376 schools, a population of 448,827, and a school population of 81,079, 370 of who were half-timers.

During the year a reduction in the staff from eight inspectors to one took place, with the result that only newly entered and delicate children were examined.

A system has been inaugurated whereby the Health Visitor of the County Council and the Local Authorities visit the schools and homes of the children four times in the year.

This seems quite insufficient, especially as the Staffordshire children seem unusually filthy, 31 per cent being so described.

In the county there are 535 or 0·64 per cent. of the school population mentally defective, of whom 111 were idiots or imbeciles.

The School Medical Officer explains to his Committee that the various types and degrees of mental deficiency are due to different parts of the brain being affected. He goes on to describe children who are grossly inattentive, lazy, and bored, and those who are exceedingly clumsy with their hands, but these are not included among the 535. Next come the children incapable of anything but a rudimentary approach to the three R's, very fair at manual work and with infirm judgment. Residential treatment is required for these and for the next group, the members of which cannot learn to read or write, and who are too restless to take any part in school life.

Between these groups are children fair at manual work but of poor scholastic powers, possessing sometimes sound judgment or with varying degrees of instability and impulsiveness. They are capable of performing simple tasks under guidance: they should be treated by special non-literary classes in ordinary schools. Among these are the word-blind and the word-deaf. One-half or two-thirds of the mentally defectives would be better taught in special classes in elementary schools, the remainder being segregated in special institutions or day schools.

In estimating mental deficiency, modified Binet and Simon tests have been used, and a grading of (1) about normal, aged 3; (2) mentally, between 3 and 6; (3) or a poor 9, is used instead of the rigid standardisation according to age.

An inquiry concerning malnutrition was undertaken by Dr. Lila Grey and Dr. Lyra Mackenzie among children between the ages of 5 and 6, living in equal proportions in rural and urban communities: 14,322 well-nourished children were compared with 2389 ill-nourished scholars. One inspector found from 10 to 12 per cent., the other 17 per cent. of malnutrition. Boys and girls showed subnormal nutrition in equal proportions. The average height of ill-nourished children is less than the well-nourished, and likewise the average weight, but weight is depressed to a greater extent proportionately than the height. There is a larger proportion of narrow homes, out-working mothers, and personally unclean children among the ill-nourished, but the difference is not striking.

Enlarged tonsils and adenoids have little or no causal influence on nutrition. The preponderance of rickets in the ill-nourished groups is very striking. Anæmia claims considerably more of the ill-nourished. Six times more tuberculosis occurred among the ill-nourished. C. R.